DEC 1 1923

MECHANICAL ENGINEERING

INCLUDING THE ENGINEERING INDEX

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DECEMBER 1923

THE MONTHLY JOURNAL PUBLISHED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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N. R. Gibson

W. L. Churchill

E. L. Robinson

W. H. Tschappat

O. P. Hood

E. C. Peck

J. M. Lessells

Contributors to this Issue

Col. William H. Tschappat, Commanding Officer at the Aberdeen Proving Ground, contributes a paper to this issue on New Instruments for Physical Measurements which gives the results of recent research work conducted by the Ordnance Department at Aberdeen. Colonel Tschappat is an authority on ballistics. Two years after his graduation from the U. S. Military Academy he was transferred from his work in the Artillery to the Ordnance Department and his services here have been principally in connection with explosives and ballistics. He served for five years (1912–1917) as Professor of Ordnance and Gunnery at the U. S. Military Academy previous to his work at the Aberdeen Proving Ground.

Colonel Tschappat's textbook on Ordnance and Gunnery is published by John Wiley and Sons. He is the author of the article on Ballistics which appears in the latest edition of the Encylopedia Britannica.

* * * * *

Norman R. Gibson was born in Guelph, Ontario, in 1880. Since his graduation from the University of Toronto his work has been devoted chiefly to problems of water-power development. He has had valuable experience in these problems on both sides of the river at Niagara Falls, and at present holds the position of hydraulic engineer for the Niagara Falls Power Company. He offers in this issue a paper on the Gibson Method and Apparatus for Measuring Flow of Water in Closed Conduits.

Mr. Gibson is a member of the American Society of Civil Engineers and of the Engineering Institute of Canada.

* * * * *

Ernest L. Robinson is the author of the paper on The Margins of Possible Improvement in the Central-Station Steam Plant. Since his release from the army he has been associated with the General Electric Company at Schenectady, devoting his activities to the structural improvement of the steam turbine and its more efficient application.

Mr. Robinson is a graduate of St. Lawrence University in the class of 1911. Three years later he was graduated from the Harvard Graduate School of Applied Design with a master's degree in civil engineering. His early experience was in structural engineering both steel and reinforced concrete, and also in water-power engineering. During the war he served in France as a first lieutenant with the 302d Engineers, and subsequently as captain and adjutant of the Second Engineer Training Regiment.

* * * * *

O. P. Hood, whose Factors in the Spontaneous Combustion of Coal appears in this issue, is chief mechanical engineer of the U. S. Bureau of Mines, and is in charge of the Bureau's fuel investigations. He was born in Lowell, Mass., in 1865 and holds degrees of B.S., M.S., and M.E. from Rose Polytechnic Institute. After leaving college Mr. Hood had some experience in the drawing and designing of small machinery, but after a few years he turned to teaching as a profession. From 1886 to 1898 he was in the engineering department of the Kansas State Agricultural College, and from 1898 to 1911 he was Professor of Mechanical and Electrical Engineering at the Michigan College of Mines, being engaged in general mechanical engineering practice as well. Since 1911 Mr. Hood has held his present position with the Bureau of Mines where his experience has fitted him to speak with authority on the fundamentals of coal storage with minimum danger of spontaneous combustion.

* * * * *

William L. Churchill sees a need for thousands of engineers in a field hitherto practically untouched by them which he discusses in his paper on The Mechanical Engineer in the Management of Woodworking Industries. Mr. Churchill is an established consulting engineer in industrial efficiency in New York City. He was born in Montpelier, Vermont, in 1871 and has devoted his life largely to developing the efficiency of the various organizations with which he has been connected.

While with the Pneumatic Service Company in Chicago, Mr. Churchill designed, developed, and constructed a new type of automatic cable-operated cash-carrier system for department stores. Later he became general superintendent for the Schreiber & Conchar Manufacturing Company at Dubuque, Iowa, and then superintendent of rates for the Yale & Towne Manufacturing Company. In 1908 he went with Stephen T. Williams and Staff of New York City, leaving them in 1912 to become works manager for the McKinnon Dash Company at St. Catherine, Ont. In 1914 Mr. Churchill entered the consulting field as an efficiency engineer, specializing on the diagnosis of causes for industrial inefficiency and prescribing and applying remedies. He has been a frequent contributor to the technical press.

* * * * *

J. M. Lessells, who presents some Notes on the Fatigue of Metals, was born in Dunfermline, Scotland, in 1888. Following a five-year apprentice course in mechanical engineering work, he became a Carnegie scholar, attending Heriot-Watt College, Edinburgh, and the University of Glasgow, receiving his B.Sc. in Engineering from the latter in 1914. He was inspector of engines and aircraft material for the British War Department from 1914–1916, later becoming connected with the Rolls Royce Company in Derby, England. In 1920 Mr. Lessells came to this country where he is now in charge of research on problems in mechanics for the Westinghouse Electric and Manufacturing Company in East Pittsburgh. He is a member of the Institution of Mechanical Engineers and of the Automobile Engineers of London.

* * * * *

E. C. Peck, presents a paper on the Unilateral System of Tolerances. He was born in Akron, Ohio, in 1867. His early drafting-room and shop experience was gained with the Akron Iron Company, the Cleveland Twist Drill Company and the B. F. Goodrich Company. Then for five years he had charge of the twist-drill department of the Whitman & Barnes Company. Following this he held responsible positions with the T. & B. Tool Company, Danbury, Conn., the Morse Twist Drill & Machinery Company, New Bedford, Mass., and the Cards Tap & Die Company before returning to the Cleveland Twist Drill Company, where for many years he has held his present position as general superintendent.

Forest Conservation and Hydroelectric Development

are of tremendous importance to engineers and are to be stressed at the coming A.S.M.E. Annual Meeting, New York, December 3 to 6. An added attraction will be the National Exposition of Power and Mechanical Engineering to be held simultaneously. For details of the complete program see the *A.S.M.E. News* for November 7 and 22.

MECHANICAL ENGINEERING

Volume 45 December, 1923 No. 12

New Instruments for Physical Measurements

Instruments and Methods Developed in Connection with Recent Research Work by the Ordnance Department

By COL. W. H. TSCHAPPAT,[1] ABERDEEN, MD.

IT IS a well-known fact that the precision required in the construction of small arms, cannon and other ordnance matérial is, in many respects, greater than that required in the manufacture of commercial machinery. The tendency in ordnance construction has always been to hold to small clearances and correspondingly small tolerances. We can readily understand the necessity of accurate measurements in the construction of hand arms or small arms, and the use of small tolerances was found necessary during the long period of evolution of this type of weapon. At one period in the development of the art of gun making, this was about the only class of metal work which required accurate finishing. The gun lock was at one time about the most complicated piece of metal machinery. If we except the art of clock and watch making, which may be considered a craft in itself, it will appear that the art of gun making furnished the first incentive to accurate machine work.

Measurements of Distance

The Built-Up Gun. In the later development of the breech-loading cannon, the "built-up" cannon, and their complicated mounts devised to increase the rapidity of fire and the convenience of maneuvering, accurate measurements in various parts have been called for. As an example, the diameter of the bore of the 75-mm. gun across the lands is required to be 2.95 in. as a minimum with a plus tolerance of 0.004 in. The diameter of the "bourrelet" or forward bearing surface of the projectile fired from this gun is limited to a maximum of 2.938 in. with a minus tolerance of 0.005 in. As an accident, fatal to the gun if not to the crew, would be likely to occur if the minimum diameter of the bore or the maximum diameter of the bourrelet were exceeded, the necessity for accurate measurements of these parts can readily be realized.

This particular gun is of the type known as "built-up," which means that the jacket heated to a high temperature is assembled to the cold tube. Upon cooling the jacket contracts, exerting a pressure upon the tube which places the inside layers of its metal in a state of tangential compression. This construction adds to the strength of the gun by permitting the metal at the interior of the jacket, as well as that at the interior of the tube, to be brought into full play when the powder pressure is exerted in the gun. To accomplish this result, however, it is absolutely essential that the proper amount of shrinkage or difference between the interior diameter of the jacket and the exterior diameter of the tube when both are cold, be provided. If too much is allowed, the tendency is to crush the interior of the tube upon shrinkage and thus weaken or crack the interior of the bore. If too little is allowed, the full additional strength of the gun will not be developed.

In this gun the exterior diameter of the tube is 5.000 in. and the interior diameter of the jacket is 4.994 in. The shrinkage prescribed is 0.006 in. ±0.001 in. In assembling, the jacket is first bored on the inside and the tube is then turned. If a single gun is made the dimensions of the tube are determined by the actual dimensions of the jacket in which it is to be assembled so as to give the required shrinkage. In quantity production the jackets to be assembled to tubes are selected by actual measurements so as to give the required shrinkage.

[1] Aberdeen Proving Ground, Ordnance Dept., U. S. A.

Contributed by the Ordnance Division for presentation at the Annual Meeting, New York, December 3 to 6, 1923, of The American Society of Mechanical Engineers. All papers are subject to revision.

Pneumatic Recuperator. Another part of the gun, or rather its mount, in which extremely accurate work is required is the recuperator. Since the requirement in this mechanism is that a packed piston moving in a cylinder must not leak air or nitrogen under pressure, the necessity for extreme accuracy can be realized. Not only is the uniformity of the diameter of the cylinder of the recuperator of great importance, but the surface must be of such smoothness as not to wear out the packing of the piston nor permit the escape of gas. That the difficulties in doing this have been overcome is proved by the fact that recuperators have been known to have been in operation or storage for two or three years without appreciable loss of pressure. The attainment of this extreme accuracy of machine work was one of the problems of the war which was eventually solved by the American manufacturers who had contracts for this work.

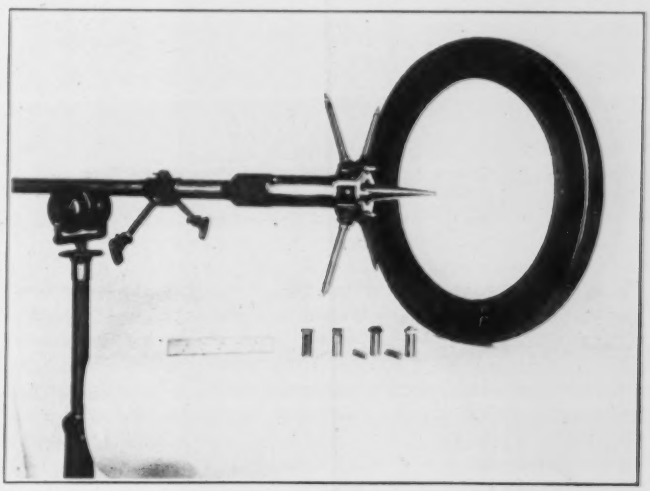

Fig. 1 Star Gage for Measuring Interior Diameters of Tubes and Hoops of Built-Up Guns

Star Gage. The interior diameters of guns, and of the component tubes and hoops of "built-up" guns, recuperators, etc., offer a special problem of measurement. On account of the great length of these parts compared with the interior diameter, it is not possible to obtain accurate measurements with gages of the ordinary type.

The instrument used for obtaining these measurements throughout the length is known as a star gage, and is shown in Fig. 1. Briefly, it consists of a head having four arms, as illustrated, of which two at opposite diameters contain radially moving measuring points operated by the steel cone which is moved in the direction of the rod by a screw thread. The other two arms are fixed and serve as guides to hold the instrument in a central position. Operation is by turning a handle at the end of the rod. Longitudinal scales on the rod serve to measure the distances from the end of the tube at which measurements are taken. The supports shown are necessary for long hoops to guarantee that the measurements will be taken at right angles to the bore.

It is the usual practice to take measurements with this instrument on two diameters at right angles to each other. In addi-

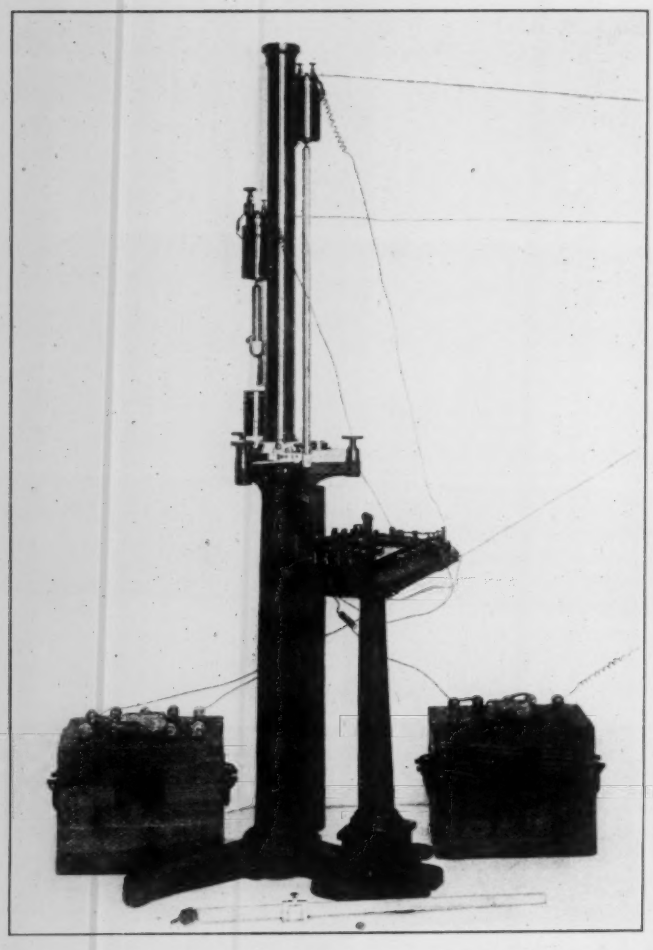

FIG. 2 THE BOULENGÉ CHRONOGRAPH

tion to the interior measurements of hoops which are made before assembling, this instrument is used in measuring guns after firing to show what expansion has taken place, either due to the actual strain of the metal or the wearing out or erosion of the bore.

Several sizes of this instrument have been constructed, permitting the taking of these measurements upon the shoulder rifle having a diameter of the bore of 0.3 in., and on the 16-in. gun and all intermediate sizes.

Exterior measurements are made with calipers of a commercial type, and of course a great deal of ordnance construction is made with jigs and specially constructed gages. One very important use of ring gages is in the measurement of the diameters of projectiles.

MEASUREMENTS OF TIME

The accurate measurements of distance which have been described are made during the manufacture of ordnance and, in so far as interior measurements of the bore are concerned, again during the "proof firing" or test to determine whether the gun will stand up. At this time measurements are also usually made to determine whether various parts of the mount, including the recuperator, are being distorted by the stresses put upon them by the firing. These measurements of distance are important as they are sure indications of whether or not the gun is equal to its work.

In the test of any experimental gun or mount it is, however, also desired to know at all rounds the velocity which is being given to the projectile. The velocity is obtained by measuring the time of passage of the projectile over a measured distance. The measurement of velocity therefore resolves itself into a measurement of time and a measurement of distance.

Boulengé Chronograph. The instrument almost exclusively used in the proving grounds of all countries until recent years for this measurement is the Boulengé chronograph. This instrument, illustrated in Fig. 2, is well known to many members of the Society and will not be described in detail. Its operation depends upon the breaking by the projectile of wires strung upon two screens placed at a known distance apart in front of the gun, thus interrupting the current in two circuits, each of which includes one of the screens and one of the magnets which support the rods of the instrument. The breaking of the first screen releases the long rod, and that of the second screen the short rod. The distance the long rod falls in the time of passage of the projectile between screens is recorded through the mechanism of a knife released by the impact of the short rod. The time is readily computed from the distance of fall.

This instrument has given long and efficient service at many proving grounds; however, malfunctioning and errors frequently result when long, sharp-pointed projectiles are used, for the reason that the screen wires either fail to break or break only after the point of the projectile has passed some distance through the screen. The result is either complete failure or an inaccurate result due to the change in distance between screens. For example, if the nominal distance between screens is 100 ft. and the projectile breaks the wires of the first screen when the point reaches them, and the wires of the second screen when the point has passed one foot beyond, the actual distance will be 101 ft. and the error in velocity computed from the nominal distance between screens will be 1 per cent. It was to overcome this defect of the Boulengé chronograph, which was accentuated by the tendency toward the use of sharp-pointed projectiles, that a study was started at the Aberdeen Proving Ground during the war which led to the development of the Aberdeen chronograph.

Aberdeen Chronograph. This instrument and the fall apparatus as constructed are shown in Fig. 3. The principle upon which it operates is shown diagrammatically in Fig. 4, which also shows on the right the apparatus used in calibrating it. Referring to Fig. 4, the instrument consists of a drum, *a*, 500 mm. in circumference, driven by a constant-speed motor *b* at the rate of 25 revolutions per second. A strip of record paper carried on the interior surface of the drum is held in position by centrifugal force. At the rotational speed the linear velocity of the strip is 12,500 mm. per sec. The operation of the instrument requires a source of direct current at 110 volts, preferably from an independent battery. This single source of power drives the motor and furnishes the current through the primaries of the induction coils as the projectile completes the circuits in the screens *c*, *c*. The latter consist of two sheets of tin (or tin or lead foil for small projectiles) separated by insulating material—cardboard or oiled paper. As the point of the projectile

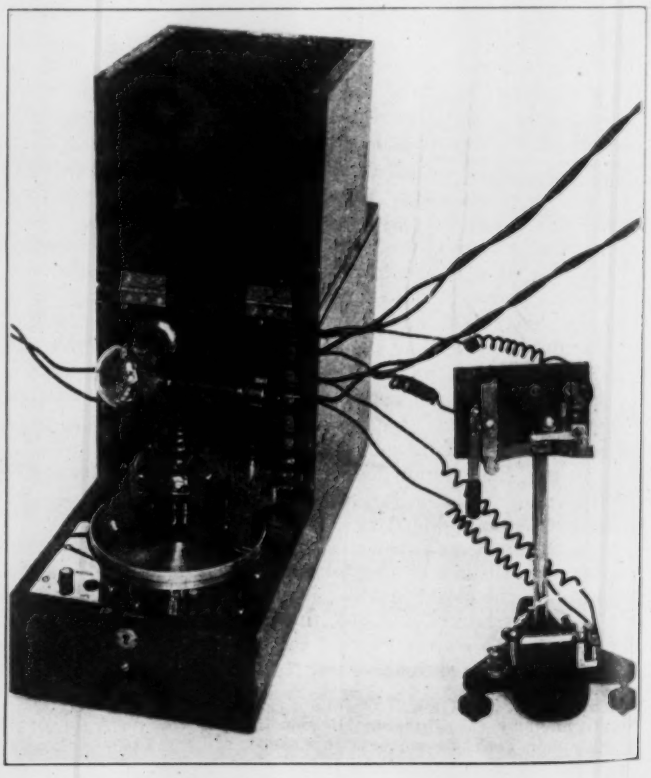

FIG. 3 THE ABERDEEN CHRONOGRAPH

penetrates the screen it makes contact with the metal on opposite sides of the insulating material, thus completing the primary circuit in the induction coil and causing the secondary to produce a spark which pierces the record strip on the interior of the drum. There are three circuits and three spark coils provided in each instrument, so that it is possible to get a record with three screens. Since the drum is rotating with a uniform and known speed and the distance between screens is known, one may readily compute the average velocity between any two of the screens.

While tests have indicated that the governor of the motor actually does keep the speed very nearly constant over any short period of time, differences of temperature, state of lubrication, etc., may cause changes in speed. Since it is necessary not only that the speed be constant during the experiment but that it be known, the calibrating apparatus shown at the right of Figs. 3 and 4, known as the "fall apparatus," is used frequently when the chronograph is being operated. It may be seen that the two "make" points of this apparatus are each connected in parallel with one of the screen circuits. When the trigger mechanism of the fall apparatus is released, one of the primary circuits is closed, a spark is produced in the secondary, and the steel ball *d* begins to fall. When the ball reaches the base of the apparatus it closes the second primary, producing a spark in the corresponding spark point. The height of the apparatus is so designed that the time of fall of the ball corresponds to five revolutions of the drum. The records produced by the spark on the record strip should therefore be opposite each other. If they are otherwise, correction for the discrepancy can easily be made or the speed of the motor can be adjusted.

As a result of continuous use of this instrument at the Proving Ground over a period of five years, it has been demonstrated that its accuracy under the best conditions of use is fully equal to that of the Boulengé instrument under similar conditions. While inaccuracies result with the Boulengé instrument when sharp-pointed projectiles are being fired, this condition is favorable to the Aberdeen instrument. On the contrary, the Aberdeen instrument may give erratic results when blunt-nosed projectiles are being fired, due to poor contact at the screens. This can generally be overcome by fitting the noses of the projectiles with spikes. Better results are generally obtained with small projectiles than with large ones, probably on account of the more sudden "make" of the current

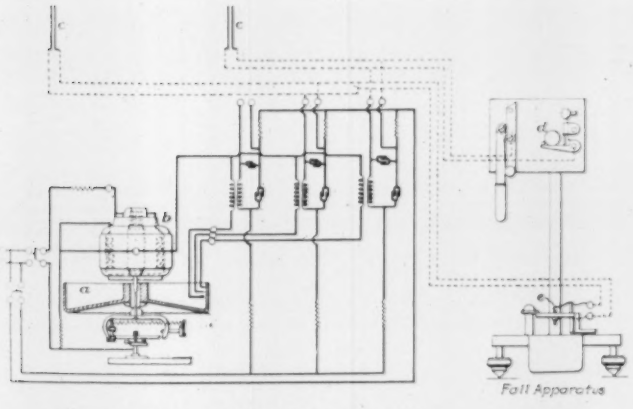

FIG. 4 CONNECTIONS OF THE ABERDEEN CHRONOGRAPH

at the screens. Two hundred and twenty (220) volts in the screen circuits gives better results with large projectiles than 110 volts. Tests have shown that under favorable conditions both the Boulengé and Aberdeen instruments are capable of measuring short intervals of time with a mean error of 0.0001 sec. If the screens are 150 ft. apart and the projectile has a velocity of 3000 ft. per sec., it will require 0.05 sec. for the projectile to pass from the first screen to the second. If the instruments read 0.0501, the indicated velocity will be 150/0.0501 or 2994 ft. per sec., an error of 6 ft. per sec.

MEASUREMENT OF AIR RESISTANCE ON PROJECTILES OF VARIOUS FORMS

Ordnance engineers have long been aware of the marked increase in range that can be obtained with projectiles by constructing them with longer and sharper points. Before the late war this method of increasing the range was not taken full advantage of, as gun mounts then in existence seldom permitted the firing of guns at elevations corresponding to their maximum ranges. The nature of the fighting during the war was such as to give a marked advantage to the side having artillery of the longest range, and all expedients were therefore used to increase the range. It was found that other changes of form besides that of sharpening the point have the effect of reducing the air resistance and increasing the range. Important among these is beveling or "boat-tailing" the projectile at the rear end. The position of the rotating band is also found to have an important effect upon air resistance. Shortly

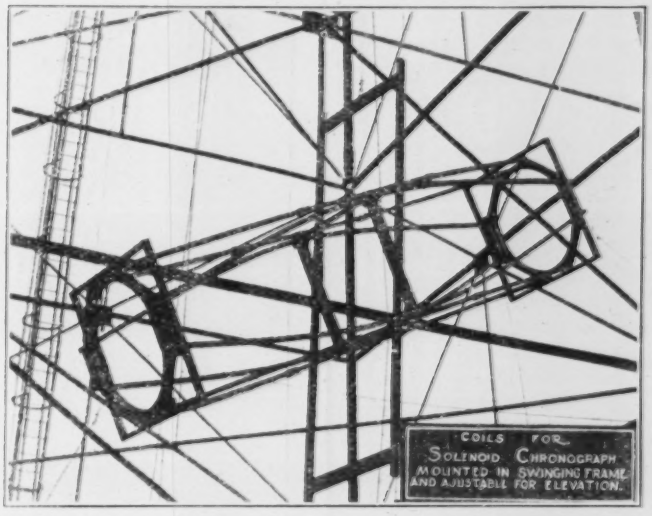

FIG. 5 FRAME FOR COILS OF THE SOLENOID CHRONOGRAPH

after the war the Ordnance Department decided to make a thorough investigation of the effect of form of projectiles upon air resistance and consequent range.

The first scientific investigation of the air resistance opposed to a moving projectile was made by Bashford in England. Later, extensive tests were made by the Gavre Commission in France and Krupp in Germany. These later tests were made upon projectiles of the service type at the time, having a length of head about equal to the caliber, and a square base. The Ordnance Department decided to conduct experiments along two lines: (*a*) Suspend projectiles of selected forms in a moving air stream and measure the resistance by means of a mechanical balance; and (*b*) fire projectiles of selected forms and measure the velocities at several points down the range.

Method (*a*) has never been used before on projectiles, as the difficulty of obtaining an air stream even approximating the velocity of a modern projectile has been considered insurmountable. However, arrangements were made with the General Electric Company for the installation of a suitable orifice to connect with one of the large blowers manufactured by this company at Lynn, Mass. With this installation it has been found possible to obtain a velocity of 1200 ft. per sec. with a 12-in. orifice, and 1600 ft. per sec. with a 7-in. orifice.

Method (*b*) is the classical one for obtaining measurement of the air resistance opposed to projectiles. In principle it consists in determining the drop in velocity of the projectile at measured intervals of time and distance. Since the method depends upon the determination of differences in velocities amounting to a fraction of a per cent of the velocities themselves, one can readily see the necessity of having very precise measurements of the velocity. Although the Boulengé chronograph was formerly used for similar tests, it was considered highly desirable to use an instrument of greater precision if one could be obtained.

Solenoid Chronograph. As a result of this need, the Ordnance Department and the Bureau of Standards developed and put into operation an instrument known as the solenoid chronograph. An instrument involving the same principles had already been experimented with in England. The projectile, after being magnetized, is fired through coils of wire which may be mounted separately or at the ends of a cage as shown in Fig. 5. Separate mount-

ing is used for horizontal firing and cage mounting for firing at very high elevations.

The passage of the projectile through the coils generates a current which is led to an oscillograph and causes deflection of the mirror element of that instrument.

The chronograph camera, shown in Fig. 6, consists of a cylinder 5 ft. in circumference, driven by an electric motor at a speed of four or more revolutions per second, and so arranged that it can also be made to move axially. The cylinder is arranged to receive a photographic film 4 in. in width. It is completely enclosed by a lightproof housing which carries the shutter and a part of the optical system for focusing the light from the oscillograph mirror and from the timing apparatus.

The latter, shown in Fig. 6, consists of a tuning fork driven electrically in such a manner that the vibrating arms do not make physical contact at any point. Thin metal plates attached to the ends of each of the arms are provided with narrow slits which pass each other as the fork vibrates. The optical system is so arranged that light can reach the film only when the slits are superposed. The source of light is a carbon arc. To use the camera the film is placed in position and the light, the tuning fork, and the electric motor are started. The switch for firing the gun is then closed, thus opening the shutter and operating the translating mechanism of the drum.

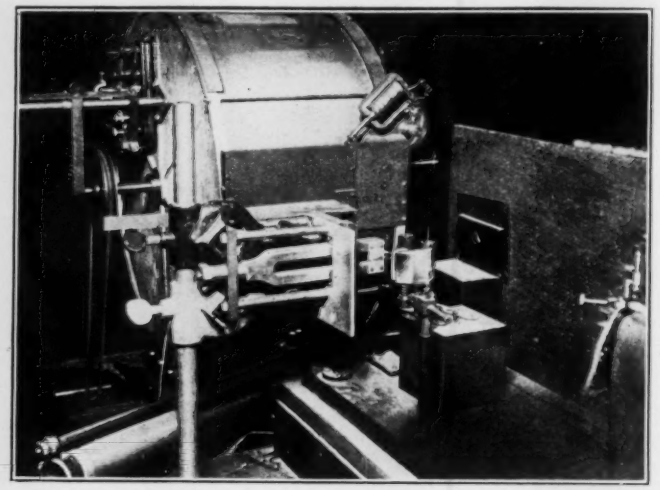

FIG. 6 THE SOLENOID CHRONOGRAPH CAMERA

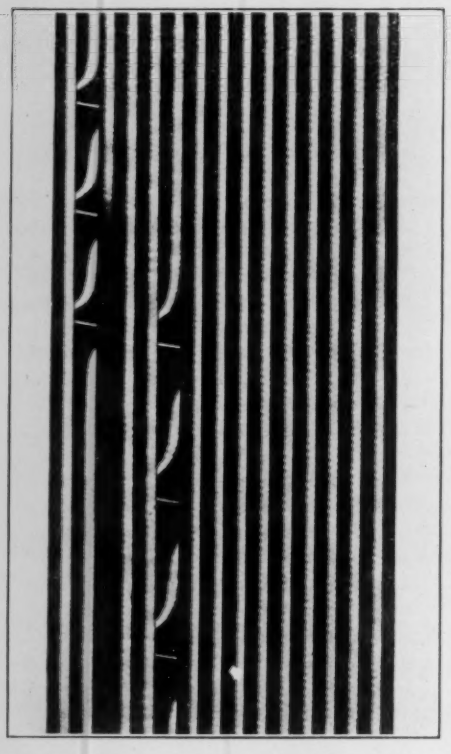

FIG. 7 RECORD MADE BY SOLENOID CHRONOGRAPH CAMERA
(Jogs in the oscillograph lines indicate passage of projectile through the coils.)

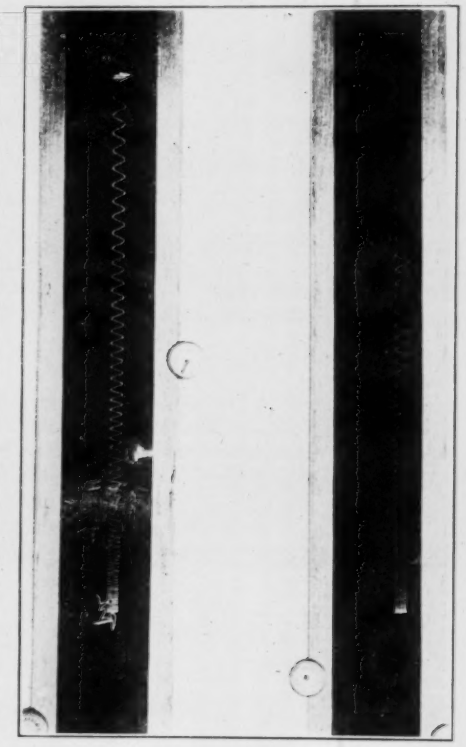

FIG. 8 RECORD OF RECOIL OF GUN MADE BY THE SEBERT VELOCIMETER

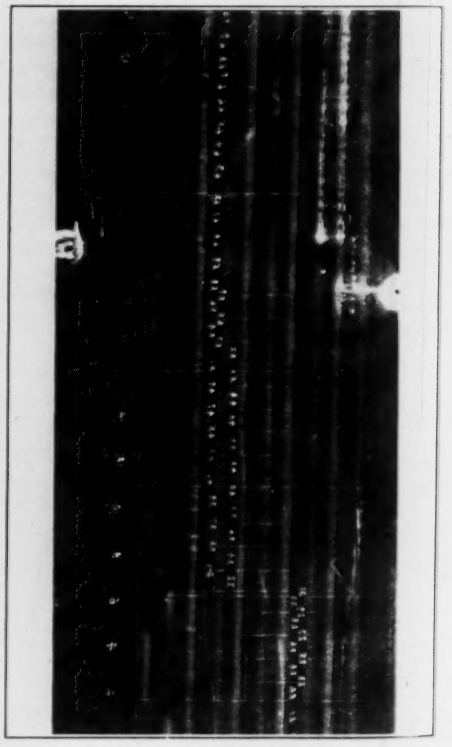

FIG. 9 RECORD OF PIEZOELECTRIC GAGE OBTAINED ON FILM OF SOLENOID CHRONOGRAPH CAMERA
(The inclined line at the right of the illustration is the record.)

Fig. 7 is the film after exposure, showing the tuning lines and the jogs in the oscillograph line caused by the projectile passing through the coils. Tests have shown that this camera is capable of measuring time to within one-hundred thousandth of a second.

The solenoid chronograph is being used successfully to measure the retardation caused by the resistance of the air acting on projectiles of various forms. As also shown by the air-stream experiments previously referred to, the resistance is very greatly affected by the "yaw" of the projectile or angle between its axis and the direction of motion of its center of gravity. Consequently the yaw in these air-resistance experiments is always determined by firing through a series of cardboards and carefully measuring the holes made by the projectile.

INTERIOR BALLISTIC EXPERIMENTS

For improvements in gun construction as well as improvements in propellant powder we must have accurate knowledge of what actually takes place when a gun is fired. It may be of interest to note that not more than 70 years have elapsed since the first successful attempts to measure the maximum pressure developed in a gun. Out of these attempts made by General Rodman, to whom we owe many other advances in ordnance construction, there was developed the modern crusher gage, some form of which is used at all testing grounds. This gage serves a very useful purpose, in that it gives a definite pressure reading and permits the setting of a definite pressure limit which must not be exceeded.

Comparisons of pressures indicated by crusher gages with velocities developed in the projectile, and with recoil energy given to the gun, have cast doubt upon the reliability of the reading of the crusher gage as a quantitative measure of maximum pressure. This doubt has been confirmed by experiments made at various times in which records of time-recoil were obtained in a free-recoiling gun simultaneously with records of crusher-gage pressure. From a good time-recoil record it is possible to get a time-acceleration record of the free-recoiling mass, and this is proportional of course to the time-pressure record.

Velocimeter. The instrument generally used to obtain the time-recoil record is the Sebert velocimeter and consists essentially of a vibrating tuning fork mounted in proximity to a smoked steel ribbon which recoils with the gun. The tuning fork, which is stationary, is fitted with a pointer placed in light contact with the ribbon. As the latter recoils with the gun it scribes a line on the ribbon, each wave of which corresponds to the natural time of the fork. A record made by this instrument is illustrated in Fig. 8.

Time-Pressure Gage. Various attempts have been made to develop a direct-reading time-pressure gage and one which would at the same time correctly represent the instantaneous pressures in the gun. Since the pressures in the gun are quickly applied and change in value quickly, the record obtained by any gage having relatively large moving parts is affected by the inertia of those parts. The results obtained with any gage depending for its action upon the crushing of metal are probably affected by the varying viscosity of the metal under varying speeds of crushing.

Quite successful gages have been constructed using springs instead of crusher cylinders, or in other words, straining metal within rather than beyond its elastic limit.

Piezoelectric Gage. In 1919 the Ordnance Department began an investigation of the possibility of constructing a pressure gage using quartz crystals, which have the property of developing a static charge when compressed. In coöperation with the Bureau of Standards, a gage of this type has since been developed and consists essentially of 12 or more quartz disks, which with metal separators are placed in a steel housing and subjected to pressure through a piston at one end. The gage proper is not larger than the crusher gage heretofore used, and is screwed into the "mushroom head" of the breech mechanism in the tapped holes provided for the former gage. The only change necessary in the gun is a means of leading a single wire connected with half the metal plates of the

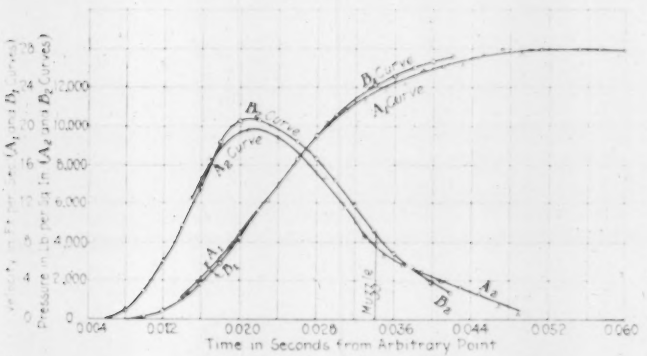

FIG. 10 VELOCITY-TIME CURVES AND CORRESPONDING PRESSURE-TIME CURVES AS DETERMINED BY RECOIL CONTACTS AND BY THE PIEZOELECTRIC GAGE

Curve A_1—Recoil velocity-time curve, recoil contacts.
Curve A_2—Pressure-time curve, computed from recoil contacts.
Curve B_1—Recoil velocity-time curve, computed from record of piezoelectric gage No. 1, using Bureau of Standards calibration of Nov. 18, 1922.
Curve B_2—Pressure-time curve, piezoelectric gage No. 1
If V = recoil velocity in ft. per sec. (Curve B_1) and P = pressure in lb. per sq. in., then $P = 7.417\ dv/dt$.

gage out through the breech mechanism. The other plates are grounded in the gage. To obtain a record with the gage, two other instruments are required, viz., a ballistic galvanometer and a rotating film camera fitted with a tuning fork to give timing lines. The camera actually used is that described above as forming a part of the solenoid chronograph and shown in Fig. 6. The ballistic galvanometer is so mounted that a beam of light from its mirror is deflected by the current from the gage at right angles to the direction of motion of the film.

When the circuit through the galvanometer is open, the charge Q, on the quartz plates is exactly proportional to the pressure developed on the piston of the gage, or $Q = cP$, the factor of proportionality depending upon the dimensions, size of plates, etc. When the circuit is closed, the charge flows through it, the relation between the current and the pressure being as follows:

$$i = \frac{dQ}{dt} = c\frac{dP}{dt} \qquad [1]$$

The current flowing through the galvanometer subjects it to a torque

$$Gi = K\frac{d^2\theta}{dt^2} \qquad [2]$$

where G is the dynamic constant of the galvanometer, K its moment of inertia, and θ the angular deflection of the mirror. In writing this equation we neglect entirely the restoring torque of the mirror

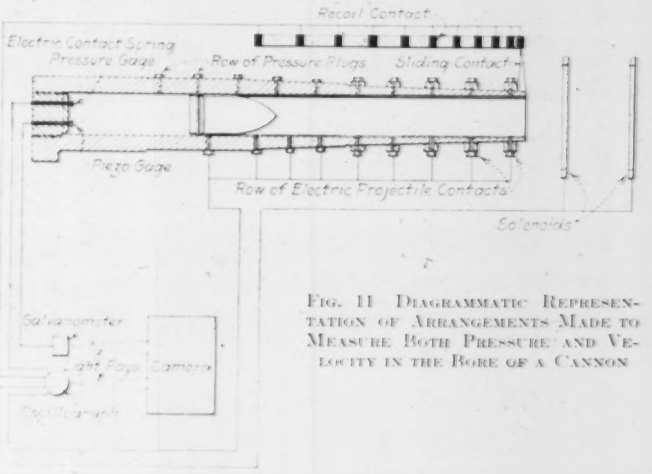

FIG. 11 DIAGRAMMATIC REPRESENTATION OF ARRANGEMENTS MADE TO MEASURE BOTH PRESSURE AND VELOCITY IN THE BORE OF A CANNON

mounting and the damping property of the instrument, both of which are small for a galvanometer of this type within the movement of the mirror with which we are concerned.

Combining Equations [1] and [2], integrating and solving, we obtain:

$$P = \frac{K}{Gc}\frac{d\theta}{dt} \qquad [3]$$

Our record on the film gives the data from which the displacement of the galvanometer as a function of time may be measured. From

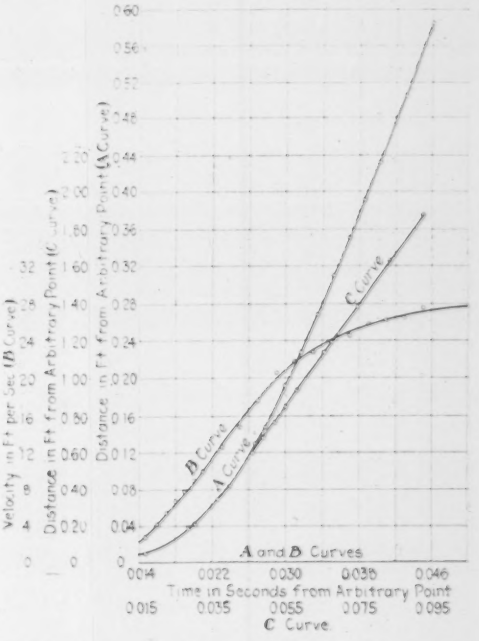

FIG. 12 DISTANCE-TIME AND VELOCITY-TIME CURVES DETERMINED BY RECOIL CONTACTS

Curve A—Distance-time curve for recoil (to 0.046 sec.)
Curve B—Velocity-time curve for recoil
Curve C—Distance-time curve for recoil (from 0.046 to 0.095 sec.)

Equation [3] we see that the slope of this curve is proportional to the pressure. Fig. 9 shows a record as obtained on the film of the solenoid chronograph camera. Fig. 10 shows in the B_1 curve the same record as plotted to another scale and the corresponding time-pressure curve B_2 obtained from it.

For the purpose of determining as accurately as possible with the new instruments available, the pressure and velocity at each instant of time during the firing of a shot, the Ordnance Department drew up a program of firing a 240-mm. howitzer, mounted so as to permit free recoil.

As shown in Fig. 11, the following data can be obtained at each round when the various contact points, time-pressure gages, etc., are made to register on the solenoid chronograph camera:

a Time of free recoil of the gun to any given point
b Time of passage of the projectile to any point in the bore
c Time of passage of the projectile to any desired number of points in front of the muzzle
d A curve of the deflection of the mirror of the ballistic galvanometer of the piezoelectric gage as a function of time
e Time the Curtis spring pressure gage reaches various degrees of compression.

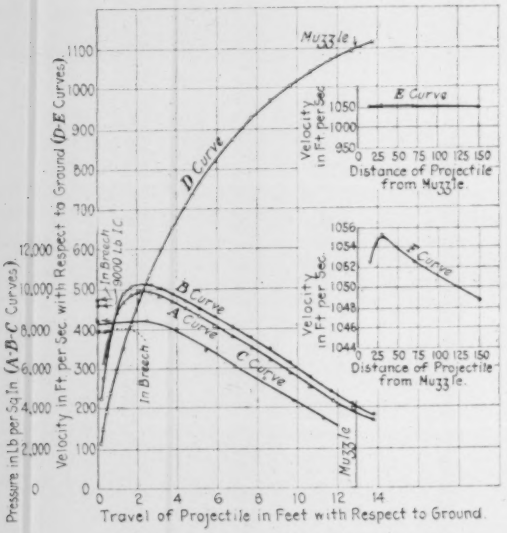

Fig. 13 Projectile Velocity-Travel and Pressure-Travel Curves as Determined by Various Methods

Curve A—Pressure-travel curve computed from recoil velocities given by recoil contacts.
Curve B—Pressure-travel curve, piezoelectric gage No. 1, Bureau of Standards calibration of Nov. 18, 1922.
Curve C—Pressure-travel curve from crusher gages of zero initial compression.
Curve D—Projectile velocity-travel curve computed from recoil velocities, assuming that the center of gravity of the powder has a velocity of one-half that of the projectile.
Curve E—Projectile velocity-distance curve (exterior) from solenoids.
Curve F—Curve E with velocity scale enlarged.
Note:—Projectile travel is estimated from recoil distance, assuming that the motion of the center of gravity of the powder is one-half that of the projectile and that the recoil is perfectly free.

The time of the actual firing of the electric primer which fires the gun is also recorded, and a connection is made by which the beginning of the motion of the projectile is recorded.

Now by plotting the distance-time curve for the motion of the projectile and differentiating graphically we may plot the velocity-time curve, and by treating this in a similar manner, we may plot the acceleration-time curve for the projectile. Knowing the weight of the projectile, this curve, when properly scaled, represents the accelerating pressure on the base of the projectile. If the frictional resistance is known to be small, as when the rotating band is removed from the projectile before firing, the last curve will represent closely the actual pressure on the base of the projectile at each instant of time.

In exactly the same manner we may plot the distance-time curve for the recoil of the gun and determine the pressure-time curve which causes it to recoil. Provided our contact mechanism is good and our time-recording instrument precise and reliable, pressure-time curves can be determined in this manner to any degree of accuracy desired by using a sufficient number of contact points.

This method, however, requires a special gun mount, special drilling of the gun, etc., which need a great deal of time to provide and set up. One of the secondary objects of these experiments with the 240-mm. howitzer is to determine whether any of the time-pressure gages available will reproduce the pressure curve given by the distance-time method.

Fig. 12 shows in *A* the recoil distance-time curve and in *B* the recoil velocity-time curve computed therefrom for Round No. 9 of this test. Fig. 10 shows in A_1 the recoil velocity-time curve as in Fig. 12 and the pressure-time curve A_2 computed therefrom. This figure also shows in B_1 the curve of deflection of the ballistic galvanometer connected with the piezoelectric gage.

As stated above, this curve is the integral of the pressures applied to the gage and the time, and to proper scale should be the same as the A_1-curve of the recoil contacts provided we omit frictional resistance. The B_2-curve of this figure results from differentiating the B_1 curve and is the time-pressure curve given by the piezoelectric gage. This particular round was fired with a projectile with a turned-down rotating band, so that the two curves, A_2 and B_2, should coincide. That they do not exactly coincide is believed to be due to errors in calibration of the piezo gage.

Fig. 13 shows the same curves as Fig. 10, plotted now to a scale of distance instead of time. The *C*-curve of this figure indicates the pressures given by copper cylinders screwed into the side of the gun at various points along the bore. It will be noted that the pressures they indicate are consistently low. In tests made using projectiles with rotating bands the pressures indicated by copper cylinders placed forward of the initial position of the projectile are invariably higher than those indicated by the other methods. In all cases the pressures indicated by gages placed in the powder chamber are lower than those indicated by the other methods. The higher pressure indicated by the copper gages used when a projectile with a rotating band is fired are believed to be due to the sudden application of the pressure to the piston of the gage. This sudden application does not take place when the band is turned down, permitting a gradient of pressure to exist, nor does it take place in the powder chamber where the development of the pressure is more or less gradual.

In the round described above, the pressure applied to the gun was determined by the recoil contact method and by the piezoelectric gage which was screwed into the breech block.

We could also have plotted the pressure computed from the projectile contacts and this would have been the pressure on the base of the projectile. However, it is rather difficult to get these contacts with the rotating band turned down.

Since the piezo gage measures actual gas pressure and the contact method accelerating pressure, the difference between the two is frictional resistance. The combination of these two methods therefore offers a means of determining the frictional resistance of a projectile during firing.

In the field of hollow-drawn forgings there have been very interesting developments lately both as regards their size and character. Recently there have been devised means for increasing the yield of gasoline from crude oil by the application of cracking methods. The oil is heated to about 875 deg. fahr. under 500 to 600 lb. pressure while circulating through tubes in a furnace, and flows to a large insulated cylinder where the completion of the cracking operation takes place. This cylinder, or reaction chamber, must stand heat, pressure, corrosion by sulphur in the oil, and be absolutely leakproof, for the gasoline under high pressure is well above its ignition point. The use of forged steel cylinders for this purpose has met with signal sucess.

A Babcock & Wilcox boiler building for the new Weymouth Station of the Edison Illuminating Co. of Boston has approximately 19,743 sq. ft., of heating surface and will furnish about 110,000 lb. of steam per hour at a maximum pressure of 1200 lb. per sq. in. The cross drum of this boiler is a forged steel cylinder of 48 in. inside diameter, 56½ in. outside diameter and 34 ft. total length over the ends, which are closed in to take a 12-in. by 16-in. manhole cover. This is one of the largest hollow forgings ever made; the forged weight is 162,000 lb., requiring an ingot of 262,000 lb. to allow for scrap and losses. The billet was cut hot from a 78-in. octagon ingot, was stood on end and upset to about 96 in. in diameter, had a 23½ in. core removed with a hollow punch, was expanded to about 50 in. in inside diameter, drawn on a mandrel to 45 in. inside diameter, 58½ in. outside diameter, annealed, tested, machined inside and out, and after closing in is to be reannealed, have the throat machined to 11¾ in. inside diameter and the exterior of the head trued up.—John L. Cox in a paper before the American Iron and Steel Institute, as reported in the *Iron Age* for November 1, 1923.

The Gibson Method and Apparatus for Measuring the Flow of Water in Closed Conduits

By NORMAN R. GIBSON,[1] NIAGARA FALLS, N. Y.

The purpose of this paper is to elucidate a new method of determining the rate of discharge or quantity of water flowing in a pipe or other closed conduit, and to describe the apparatus used for the practical application of this method in testing the efficiencies of water wheels in hydroelectric plants. The procedure in the field is explained, as well as the manner of recording, delineating, and measuring the pressure-time diagram from which the discharge is calculated.

THIS is a new method of water measurement and it has required the invention of new apparatus for its practical application. If any apology is considered necessary for introducing it at this time when so many well-tried methods and devices are already in general use, it may be found in the fact that some important advantages have already been obtained through its application to the testing of water wheels, where the inconvenience and expense of any of the older methods would have been objectionable. These advantages have made it possible to make tests at frequent intervals, at slight expense, to determine the operating condition of water wheels without seriously interfering with their commercial operation. It may also be added that in point of accuracy, measurements by the new method have been found remarkably precise when tested in accordance with the dictum of Clemens Herschel, the distinguished hydraulic engineer that "The only standard water-gaging apparatus is a tank or reservoir. Weirs, orifices, venturi tubes and meters, and other water-gaging apparatus and methods can become truly rated only by comparison with tank measurements and thus thereafter competent to give reliable service."[2]

The method herein described makes use of two well-known principles, the first being Newton's second law of motion, sometimes referred to as the equation of impulse and momentum,[3] and the second (attributed to Joukovsky) being a corollary of the first, namely, the relation between change of pressure and change of velocity of a column of water expressed in terms of the velocity of the pressure waves which are propagated during the change from one end of the column to the other. It has been in practical use for upward of three years. As a result of this experience, it may confidently be asserted that the method combines the qualities of accuracy, convenience, and economy, although it is not to be expected that the full extent of its usefulness can be determined until after a considerable period of time.

Field Work

Preliminary. Two essential conditions are required for the measurement of water by this method, first, the water must flow through a pressure pipe or other closed conduit; and second, means must be available for controlling the flow, such as a valve or turbine gates, at a point some distance from the intake. It makes no difference how large the conduit may be or whether the cross-section is of uniform area or not. The accuracy of the measurements, however, depends to some extent on the length of the conduit, and it is desirable that this should be at least 50 ft., preferably not less than 100 ft. The method does not apply to the measurement of flow in open channels.

It is evident, therefore, that not every hydraulic plant can be tested by this method. Fig. 1 shows a cross-section of a typical plant, the physical conditions of which are suitable for the simplest application of the method. Measurements of water flowing through more complicated waterways may also be made by using the differential application of this method, but for the present the discussion will be confined to the simple type here illustrated. In such a plant the water flows out of a forebay into a penstock at the lower end of which is a single modern hydroelectric unit comprising a turbine and generator equipped with a hydraulic governor. At the upper end of the penstock is a sluice gate or valve and at the lower end just at entrance to the turbine casing there is sometimes installed another valve. To set the unit in operation the turbine gates are opened by means of the governor and the water then flows through the penstock, turbine, and draft tube and is discharged into the tailrace. The unit is shut down by closing the turbine gates by the same means. The flow of water in the penstock is therefore under control at all times and the time taken in the opening or closing of the turbine gates may be varied at will by regulating the speed of the stroke of the governor, the

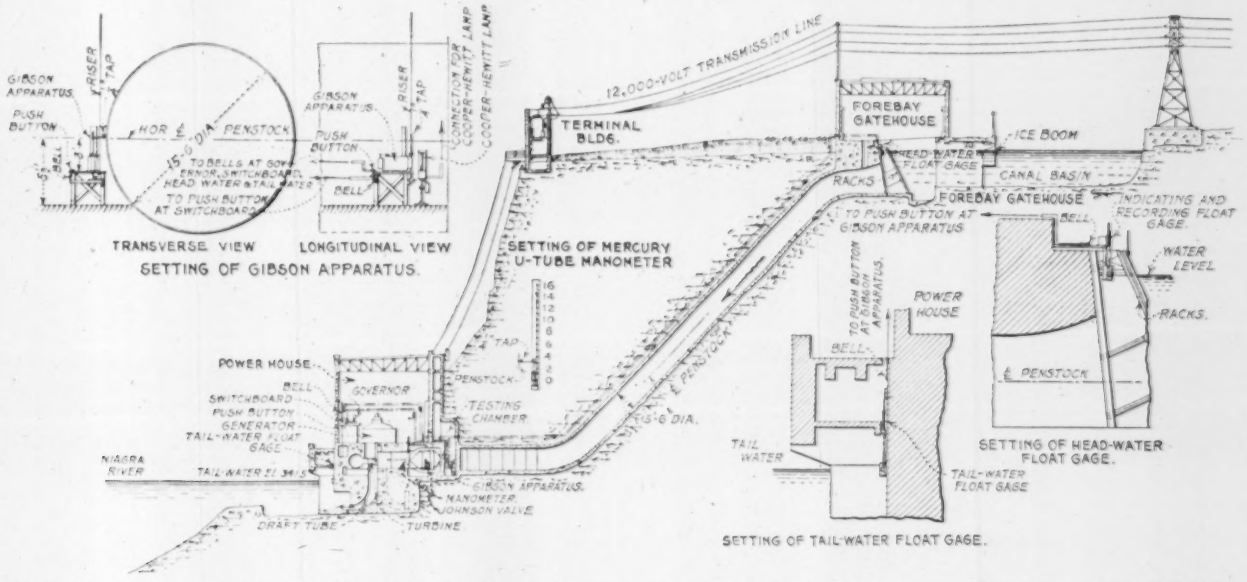

FIG. 1 CROSS-SECTION OF TYPICAL HYDROELECTRIC POWER PLANT SHOWING LOCATION AND SETTING OF APPARATUS AND EQUIPMENT FOR EFFICIENCY TESTS

[1] Hydraulic Engineer, The Niagara Falls Power Co.

[2] An Improved Form of Weir for Gaging in Open Channels. Trans. A.S.M.E., 1920.

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operation of which may be accomplished either automatically or by hand.

The apparatus required for an efficiency test, parts of which will be described in detail later, comprise the following:

a A headwater indicating and recording float gage which will give an accurate record of the headwater levels during a test. The instrument for this work must be specially designed to make one revolution of the drum in about four or five minutes so that it will show clearly, to relatively large scale, any surges that occur in the forebay during or immediately following the closing of the turbine gates.[1]

b A tailwater float or staff gage for observing tailwater levels.

c The apparatus for obtaining pressure-time diagrams, which has been called the Gibson Apparatus,[2] and which is attached to the penstock at any convenient point by means of a $\frac{1}{4}$-in. connecting pipe as illustrated in Fig. 1.

d A pressure gage or piezometer for measuring the head acting on the turbine.

e Electrical equipment for measuring the output of the generator. It is assumed that the efficiency of the generator will have been previously determined.

f A signal system (usually electric bells) for communicating with the observers at the forebay, tailrace, pressure gage, Gibson Apparatus, and electrical instruments and with the operator at the governor.

The items enumerated above include, of course, not only the apparatus necessary to measure the water, but also the equipment for measuring the power output of the turbine and for determining its efficiency. The location and setting of the apparatus and equipment is shown in Fig. 1.

Procedure. The various operations to be performed in the field to obtain the data from which the final computations are made are as follows:

It is first necessary to obtain the physical dimensions of the pipe line from its intake at the upper end to the point of attachment of the Gibson Apparatus. When the penstock is made up of pipes of various sizes, the length and area of each size should be determined and where a variable section exists, as for instance, at a flaring mouthpiece, the lengths and areas of successive sections a short distance apart should be taken so that the whole may be properly integrated. The total length along the center line of the penstock from the apparatus to the face of the mouthpiece should be accurately determined and should check with reasonable accuracy the sum of the lengths of the various parts.

The personnel engaged at the various posts should be directed by one man who has no specific duties to perform in order that he may supervise all the operations from time to time and thus be able to review the work as a whole.

After checking the elevations of the zeros of the headwater and tailwater gages, testing the pressure gage for measuring the head on the turbine, setting up the apparatus and signal system and inspecting the unit to be tested, etc., the operations to be performed are as follows:

The unit to be tested is usually synchronized with other units in the plant and allowed to run on steady load at the desired point with the gates fixed for several minutes. In fixing the gates at the various percentages of gate opening where it is desired to determine the efficiency, it is important to have them perfectly steady so as not to set up disturbances in the penstock. For this purpose it is better to use the hand control which is usually supplied in a modern governor, but if this is not available various devices may be employed to lock the automatic control valve of the governor so as to hold the gates steady for a few minutes at a time until it is necessary to release them.

When everything is in readiness a signal is given, say, "2 bells," and at that moment observations are taken of the headwater and tailwater levels, pressure at entrance to the turbine case, gate opening, kilowatt output of the generator, voltage and amperage of exciting current, and the usual entries of time and other items worthy of note.

After these observations have been made for a period of two minutes, or longer if necessary, the operator of the Gibson Apparatus sets this instrument in motion and then gives a signal, say, "1 bell," at which all the observers mark their records and the governor attendant operates the governor so that the turbine gates are gradually and gently closed. The duration of this closing action will depend upon the length of the penstock. If it is short a quite rapid closure, say, in three or four seconds, may be made. If the penstock is very long the duration of closure may take perhaps more than a minute. In a penstock from 200 to 400 ft. long a satisfactory closure may be made in from eight to sixteen seconds.

As the turbine gates close, the power output of the unit of course diminishes and its load is picked up by the other units operating in synchronism with it. When the gates are fully closed the unit continues to revolve at normal speed, being then operated as a synchronous motor by the current in the circuits to which it is connected.

The object of closing the turbine gates in this manner is to produce a change of pressure in the penstock which will occur when the flow of water therein is brought to rest. The Gibson Apparatus (which will be described in detail later) is devised to obtain a precise record of this change of pressure in the form of a diagram of which Fig. 7 is a typical example. On this diagram *A* marks the beginning of the record. At *O* the pressure begins to rise as the turbine gates are being closed. At *K* (the determination of which will be explained later) the gates are fully closed and from *K* to *C* the column of water is being restored to equilibrium in a series of damped harmonic oscillations or waves. At *Z* there is an interval of time sufficiently long to allow these oscillations to subside, and then at *F* there is a short record which registers the pressure in the penstock under the then existing hydrostatic conditions. It will be observed that narrow vertical spaces *D* where the record has been obliterated occur on the diagram at regular intervals. These intervals are records of time usually one second apart, or, speaking more correctly for reasons which will be explained presently, each pair of intervals measures exactly two seconds.

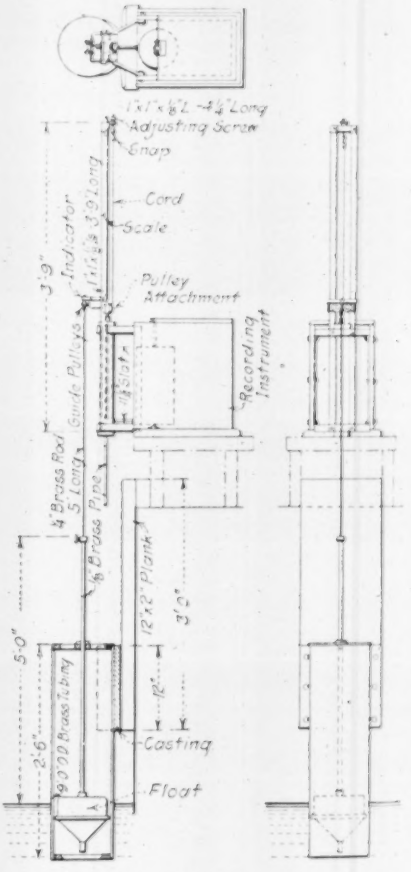

FIG. 2 HEADWATER RECORDING GAGE

Upon the completion of this record—called the "pressure-time diagram," or more simply "the diagram"—a signal is given to the observers which terminates the "run" as the operations of the test at each load are called.

The unit is then loaded up again to the next point desired and everything is placed in readiness for the next run. These operations are repeated as often and at as many points as are desired. Usually it will be found that from 10 to 12 diagrams ranging from half-gate to full load will be sufficient. Each run will require from 10 to 15 minutes, so that if no difficulties arise the field work for one unit may be completed in from two to three hours, exclusive of time required in the preparation for the test and for the leakage test which will now be described.

Leakage Test. In this method of water measurement only the

[1] When differential diagrams are used, a simple staff gage is sufficient for determining headwater levels.

[2] Method and apparatus patented, Canada 1919 and 1920, United States Oct. 13 and Nov. 22, 1921. Patents applied for in foreign countries.

flow actually shut off is measured. If the whole flow is shut off, no other operations than those described above are necessary. It usually happens, however, that the valve to be closed or the turbine gates themselves are not perfectly tight and after closure some water leaks through. The measurement of this leakage is not included in the diagram and must of course be separately determined and added to the quantity calculated from the diagram to obtain the total discharge. In a new modern unit the leakage is relatively quite small and its amount can be quickly and precisely determined in a number of ways. If the total discharge of the turbine is 100 cu. ft. per sec. and the leakage is 20 cu. ft. per sec., an error of 5 per cent in determining the leakage results in a final error in the measurement or discharge of only about 0.1 per cent. Usually, however, the leakage may be determined with much greater accuracy than this and often it can easily be measured precisely. When the leakage is relatively large, greater care in its determination will be required if precise results are desired.

It is not intended to lay down any definite rules by which the leakage factor must be found. The essential point is that it should be determined with sufficient precision in a given case, and it may safely be left to the common sense and resourcefulness of the engineer in charge of the test to do this in a satisfactory way.

APPARATUS

Fig. 1 is a general drawing showing the setting and arrangement of the apparatus and equipment, and also some details of the minor parts.

The headwater recording gage which is shown in Fig. 2 has been designed specially for use in the simple application of this method of testing. It comprises a brass float 8 in. in diameter surrounded by a well consisting of a short piece of 9-in. brass tubing mounted on a heavy plank which may be fastened in place in any convenient manner. A rod from the float is connected to a crosshead which slides between guides and is connected through a reducing block and tackle to a brass pencil as illustrated in Fig. 2. The vertical travel of the pencil may be made to correspond in any desired ratio to the variation in level of the float, but in the instrument here illustrated the pencil moves one-half the vertical travel of the float. The supports for the rod and pencil are attached to a box, the front end of which has been left open. This box contains a drum about 6 in. in diameter and 12 in. high which is operated by means of a spring motor and gearing designed so that the drum will make one revolution in from 3 to 5 min. For each run a sheet of coated paper 18 in. long by 11 in. wide is securely wrapped around the drum and receives the impression from the brass pencil which rests lightly on the surface of the paper and thus records to half-scale the motion of the float in the headwater. A clock mechanism and electric battery and magnet located inside the box operate a pointer which makes a mark every five seconds on the coated paper near its lower edge. The record of headwater level is thus combined with a record of time.

The signal system may be left to the discretion of the engineer in charge of the test. Usually a system of electric bells will be sufficient, preferably a system operated with magneto because the bells may then be connected in series. A telephone system of signaling is quite satisfactory and very convenient when the distances between observers are great. When distances are short and when conditions will permit, a horn or whistle may sometimes be used.

The apparatus for obtaining the pressure-time diagrams will need to be described in detail. Photographs of the apparatus are shown in Figs. 3 and 4. It is also shown diagrammatically in Fig. 5, to which the letters in the following description refer.

P is a pipe or conduit in which the fluid, the rate of discharge of which is to be measured, is assumed to be flowing in the direction indicated by the arrow, and V is a valve or other means, such as turbine gates, for interrupting the flow of the said fluid.

The apparatus is attached to the pipe P on the upstream side of the valve V at some point B by means of a short small pipe C in which a valve is placed near B. D is a glass tube of as nearly as possible uniform bore joined to the pipe C and to the riser pipe E—also as nearly as possible of uniform bore—by means of stuffing boxes and glands at F and G. Together the pipes C and E and the tube D form a U-tube. A quantity of mercury is poured into the top of the riser E or is otherwise introduced into the U-tube so that when the valve at B in the pipe C is opened the mercury column is depressed in tube D and rises in the riser pipe E in proportion to the pressure existing in the pipe P. Needle valves, as indicated, are provided at points 3, 4, and 5 for adjusting the height of the mercury in the tube D and for expelling air, etc. For higher heads an enlargement of the tube C is made to facilitate filling the U-tube with mercury. The difference in level between the tops of the mercury columns in D and E is then a measure of the pressure existing in the pipe P. Changes of pressure in P produce corresponding changes of level of the tops of the mercury columns in D and E.

Opposite the tube D is a box H containing a photographic lens

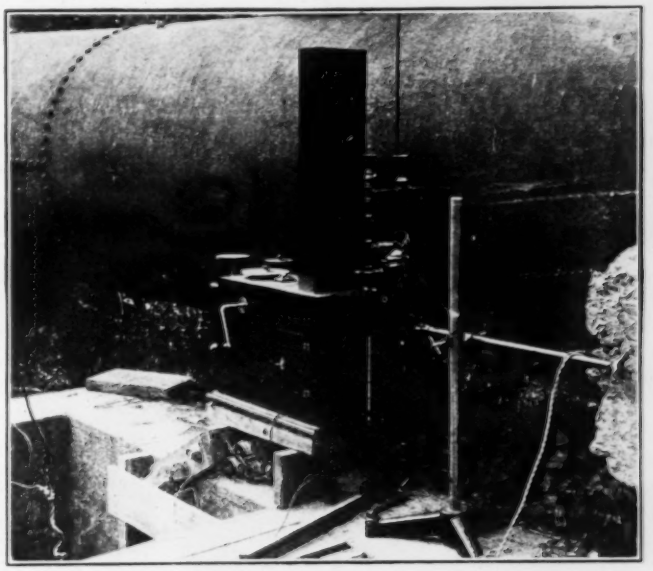

FIG. 3 FRONT VIEW OF GIBSON APPARATUS

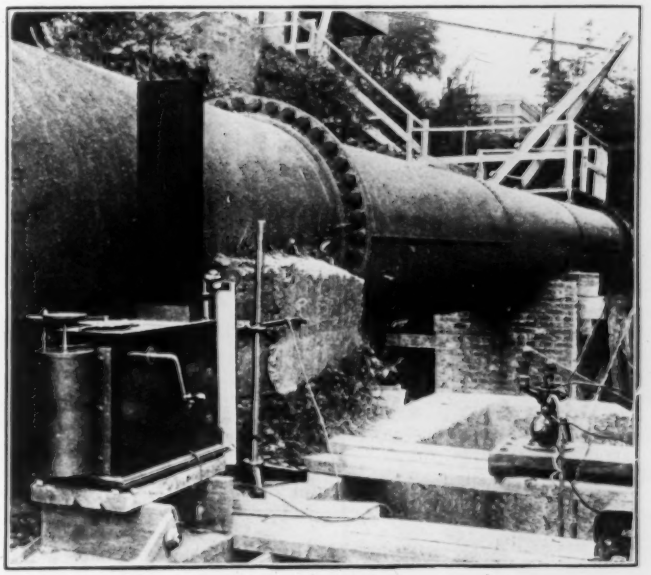

FIG. 4 REAR VIEW OF GIBSON APPARATUS

and shutter J and a pendulum K. At the top of the pendulum is a setscrew and bar L for adjusting the length of the pendulum. The pendulum cord is thickened at its lower extremity, as shown, and the whole is enclosed in an upward extension of the box.

In the end of the box opposite D is a slot about as long as the tube D and narrower than the diameter of the tube. Between the box and D is a shrouding M which excludes the light, except that which enters through the tube D from the side directly opposite the slot referred to. This shrouding partly surrounds the tube D and has fastened to it, crosswise of the tube D, two fine cross-wires 1 and 2, a measured distance apart.

At the other end of the box is an opening in which a ground

glass may be placed for observing a photographic image of the tube D cast on the glass by means of the lens J. The ground glass is for observation purposes only and may be removed and replaced by the revolving drum N set in a lightproof holder which may be attached to the end of the box H by means of guides and thumbscrews.

On the outside surface of the revolving drum N there may be attached, as required and in a dark room, a sensitized photographic film on which the pressure-time diagram is to be recorded. Photographic paper may be used, if desired, in place of the film, but usually will not give as good results on account of the shrinkage of the paper when developed.

On the side of the holder adjacent to the box there is a narrow slot, O, lengthwise of the holder, which may be opened or closed by means of the shutter A. This shutter is shown in detail in Fig. 5 and consists of a cylindrical bar through which a slot has been

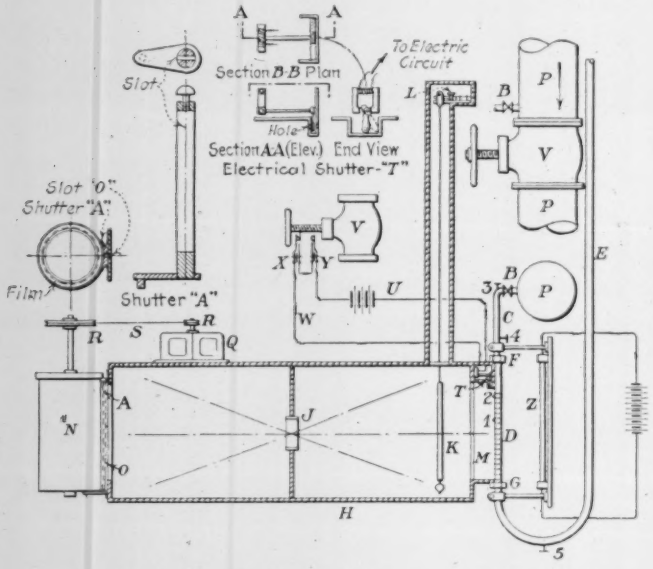

FIG. 5 DIAGRAMMATIC SKETCH OF GIBSON APPARATUS

cut. The bar fits snugly in a hole bored in the casting supporting the lightproof holder and may be revolved so that the slot in the bar will come opposite the slot O in the holder when it is desired to allow the light to pass through to the film on the drum N, or it may be turned 90 deg. from this position when it is desired to shut off the light from the film. The shutter may be held in either position by means of an arm attached to the bar and secured by a spring attached to the holder.

The drum N is revolved at uniform speed by means of a mechanical motor Q through pulleys R and belting S or through other means, its speed being regulated by a governor and flywheel.

In case the apparatus cannot be used in daylight, an electric mercury-vapor lamp Z or other means of illumination will be required.

The use of the auxiliary electrical shutter T shown in detail in Fig. 5 has been discontinued, and for the purposes of the present paper it will be unnecessary to refer again to this part of the original design.

In setting up the apparatus for the purpose of making differential diagrams, the top of the riser instead of being left open to the atmosphere is connected by means of a pipe, preferably about 1 in. in diameter, to a piezometer opening located at some suitable distance upstream from the point B. Mercury is poured into the U-tube until its surface in the glass tube D is at the required height and the remainder of the piping system is filled with water, care being taken to see that all air is excluded and that all joints are perfectly tight.

THE PRESSURE-TIME DIAGRAM

Recording the Diagram. The manner of using the apparatus and of making a pressure-time diagram is explained as follows:

The equation from which the rate of discharge is determined is $Q = KA/SF$, in which Q is the discharge in cubic feet per second, K the constant of the apparatus, S the time scale of the diagram, and F the pipe or conduit factor.

The pipe factor F of a simple pipe of uniform cross-section, such as the pipe P, Fig. 5, is the length from the point B to the upper end of the pipe divided by its area. When the pipe is made up of several lengths in series l_1, l_2, l_3, etc., of different areas a_1, a_2, a_3, etc., then the pipe factor F is

$$\sum \frac{l}{a} = \frac{l_1}{a_1} + \frac{l_2}{a_2} + \frac{l_3}{a_3}, \text{ etc.}$$

The pipe factor is determined first.

Next the ratio R of the areas of tubes D and E is obtained. For this purpose a calibrating rod is provided with the equipment. This rod is made up of several lengths of copper wire surrounded by, but insulated from, a small brass tube or sheath. These lengths may be screwed together and are so designed that connection is made between each length of copper wire without making contact with the brass sheath.

For the purpose of calibrating for R the Gibson Apparatus is set up either in the laboratory or in the field at the place where the tests are to be made and the tubes are filled with mercury as usual. By means of a small pump, or by admitting pressure in successive increments from the penstock, the mercury is depressed in D which causes it to rise in E. If the work is done in a laboratory, intermediate sections of the riser are removed so that the part of the riser E in which the mercury changes position when depressed in D is the same part as that in which the change will take place when the apparatus is attached to the penstock. It is obvious of course that when the tube D is attached to a pipe or penstock the static head existing in the pipe will force the mercury to a higher level in E and additional lengths of riser are necessary. The changes of level corresponding to changes of pressure during a test then take place in the glass tube and the sections of riser which have been calibrated. In practice it will be convenient to attach the apparatus at some point on the pipe line where the head will not be so great as to require an excessively high riser.

The calibration is then made by wrapping a film on the drum in the usual way and exposing a short section of it at a time, as hereinafter described, so as to obtain a record of the elevation of the mercury in tube D at different stages, and at each stage the calibrating rod is inserted in the top end of the riser E until contact is made between the wire in the rod and the mercury. A bell and some batteries are connected in circuit with the calibrating rod and the riser so that when contact is made between the rod and the mercury the bell rings. By this means it is possible to determine when the rod is first touching the surface of the mercury. The distance from the top of the riser to the surface of the mercury is then read on the vernier attached to the calibrating rod and recorded. After a number of exposures have been made with the mercury depressed to various points in the tube D and the corresponding position of the mercury in E is determined, the film is removed from the drum and developed and a print made as illustrated in Fig. 6. The record thus obtained when related to the height of mercury in the riser E gives the ratio of the change in E for a given change in D. This method of calibration also includes any correction that might be necessary for parallax or variation in scale.

When increases of pressure occur in pipe P it is evident that the mercury in D will fall $1/R$ times the distance it rises in E, and the total change of pressure in feet of water will be $^1/_{12}[M(R + 1) - 1]$ times the distance in inches the mercury falls in D, where M is the specific gravity of mercury. Similarly, when decreases of pressure occur in P the mercury will rise $1/R$ times the distance it falls in E, and the total change of pressure in feet of water will be $^1/_{12}[M(R + 1) - 1]$ times the distance in inches the mercury rises in D. When the apparatus is connected to the pipe P for the purpose of making differential diagrams as described in a previous paragraph, the total change of pressure in the pipe P in feet of water will be $^1/_{12}(M - 1)(R + 1)$ times the distance in inches that the surface of the mercury changes in the tube D. The sizes of the tubes D and E for any particular case are selected so that the total motion of the mercury in D is limited to the length of the tube D. A record of the position of the top of the mercury column in the tube D during any time is therefore a record of the

pressure existing in the pipe P during that time. When the flow of water in the pipe P is interrupted, a change of pressure occurs. The change of pressure affects the level of the mercury column in tube D as already mentioned, and a record of this change of level is obtained as follows:

The lens J having been adjusted and permanently fixed so that a clear image of the top of the mercury column is projected on the ground-glass screen at the end of the box, the latter is permanently removed so that the film holder may be inserted in the guides.

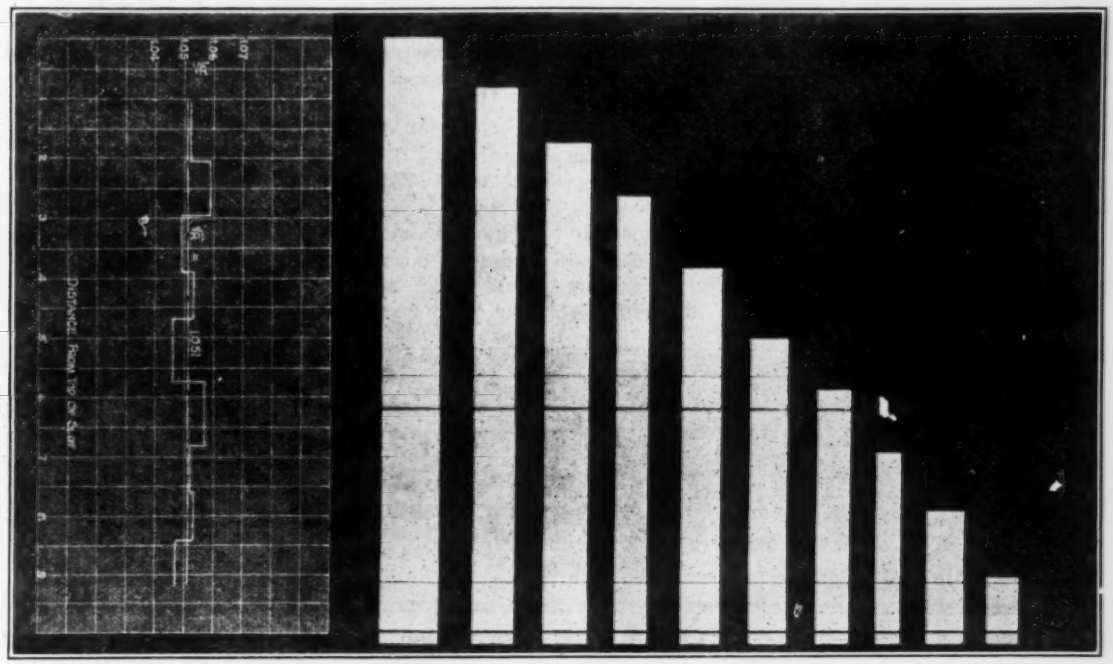

FIG. 6 TYPICAL CALIBRATION DIAGRAM

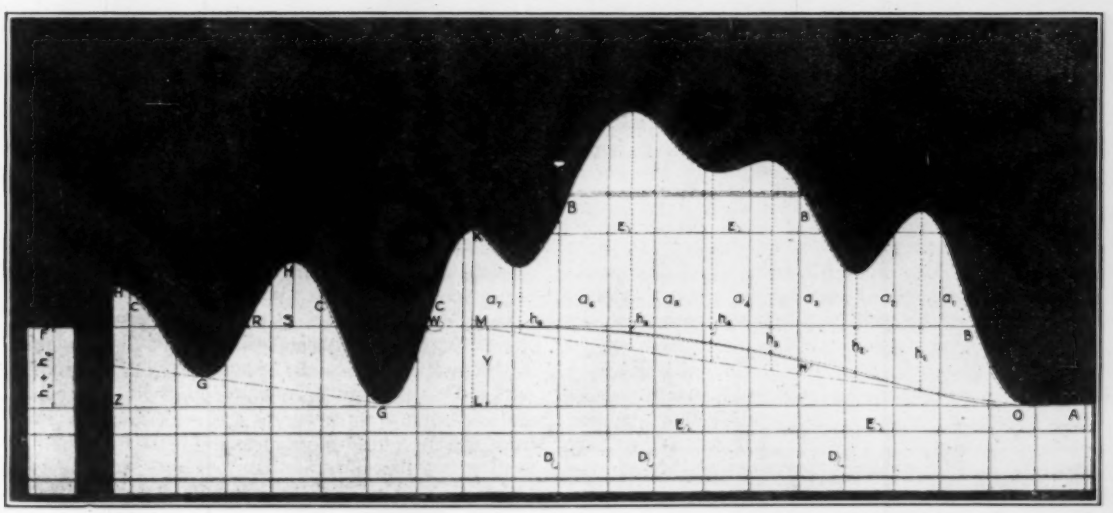

FIG. 7 TYPICAL PRESSURE-TIME DIAGRAM AFTER DELINEATION

A sensitized photographic film is wrapped around the drum N and fastened in place, the belting is slipped over the pulleys, and the motor wound up ready to start.

When all is ready the shutter A attached to the film holder is opened, the motor Q is started, and, just prior to the action of interrupting the flow in pipe P, the shutter of lens J is opened and the pendulum K is set in motion by pressing the pneumatic bulb attached to these parts. At this moment the flow in pipe P is gradually interrupted by means of the value V or by any other means. As the flow is being interrupted, the rise of pressure produced thereby causes the mercury column in the tube D to move downward. The amount of its depression is a measure of the change of pressure in the pipe P, and the motion of the top of the mercury column is photographed on the revolving film by the means above described, thus furnishing a record of the change of pressure that took place in the pipe P as the flow was shut off.

During this operation the pendulum K keeps swinging to and fro, and on account of the enlargement of the cord already mentioned, the light passing through the tube above the mercury is cut off at each swing of the pendulum. This causes a break in the record on the film at regular intervals corresponding to the time period of the swing of the pendulum, which is usually adjusted to exactly one second. If the pendulum is not centered exactly with the slot, the intervals between breaks in the record will be alternately long and short. For this reason, as explained earlier, it is better to use each pair of intervals which will exactly measure two seconds.

After the flow has been completely shut off, the oscillations of the mercury column are recorded for a few seconds. After the oscillations have ceased and quiescent conditions exist in the pipe P, a short exposure is made to obtain a record of the static pressure in that pipe. Then the shutters are closed, the film removed and developed, and prints made. The result is shown on the typical pressure-time diagram, Fig. 7, on which the line $ABBKCC$ represents the varying level of the top of the mercury column in tube

D. The *D*-lines are the breaks in the record at regular intervals caused by the swinging pendulum and the lines *E*,*E* are the photographs of the cross-wires 1 and 2 shown in Fig. 5, which are a measured distance apart, and from which the scale (usually exactly full size) of the diagram is shown. The edge *F* is a record of the level of the top of the mercury column corresponding to the static pressure in the pipe *P*.

Delineating and Measuring the Diagram. The diagram, Fig. 7, having been obtained in the manner described in the foregoing section, is treated as follows. It will be assumed for simplicity in explaining the calculations that the gates were perfectly tight when closed so that the flow was completely shut off when the diagram was made. The numerical example which will be given later will include the leakage factor.

1 Horizontal lines are drawn across the diagram, coinciding with lines *F* and *A*, respectively. If *A* is wavy due to slight variations in pressure of the water flowing in the penstock, the mean position between crest and valley of the wave may be used.

2 As the diagram is produced by means of an exposure through a narrow slot in the film holder, the width of slot will cause the diagram to be slightly larger than it would be if drawn by a point or by exposure through a slot of infinitesimal width. To correct for this lines may be drawn as shown at *B*,*B* and *C*,*C* at a distance equal to the width of slot from the edges of the pressure line so that when thus drawn these lines, together with the other edges of the diagram, delineate the pressure line that would be drawn if the slot were of infinitesimal width. A little study will make it clear that the width of slot is drawn only on either the right-hand or left-hand edges of the diagrams but not on both, depending on the direction of rotation of the drum. If desired, this correction for width of slot may be made by simply multiplying the width of the slot by the sum of the vertical heights of the corresponding edges of the pressure line. Usually this will be more satisfactory.

3 The point *K* which marks the end of the diagram, or more specifically the end of that part of the diagram which represents the impulse produced during the closure of the gates, is determined from the record *C*,*C* of the oscillations of the mercury column in the apparatus which occur after the turbine gates have ceased to move. These oscillations or waves are of uniform periodicity like the oscillations of a pendulum, and the horizontal distances measured in time intervals between the vertical lines passing through the peaks of the waves as from *H* to *H* and *G* to *G* are equal. The positions of the vertical lines passing through the peaks of the waves at *H*,*H*, etc., may be determined in several ways, such as by inspection or by the intersection of tangents to the points of inflection of the wave line.

4 The end of the diagram is at the beginning of the first regular wave nearest *AA* as at *HK*, and the position of *K* is determined by measuring back from *W* the point where the wave passes the neutral line *FM*,[1] a distance equal to *RS*. The position of the vertical line through *K* may also be found by marking off from the peak of the nearest wave a horizontal distance equal to one wave length *HH*. A vertical line *KML* is drawn through *K* intersecting the line *F* produced at *M* and the line *A* produced at *L*.

5 The point where the pressure line *B* departs from the line *A* is marked at *O*.

6 A straight line is drawn from *M* to *O*.

7 A number of vertical lines are drawn from the pressure line *BB* to intersect the line *OM* and the areas a_1, a_2, a_3, a_4, a_5, a_6, a_7, enclosed by these lines and corrected for width of slot, are measured by planimeter or by scaling in square inches. The sum of these areas will be called A_1.

8 The distance *LM*, which is a measure of the sum of the friction and velocity heads, is measured in inches and called *Y*.

9 Trial and error are now used to locate the line *ONM* which eliminates from the gross area the area produced by the recovery of friction and velocity heads.

As a first assumption the straight line from *O* to *M* may be taken, but usually it will be found easy to estimate by inspection the approximate position of the line *ONM* so that only one correction will be necessary.

$$\text{Let } P_1 = \frac{a_1}{A_1}, \qquad P_2 = \frac{a_1 + a_2}{A_1}, \qquad P_3 = \frac{a_1 + a_2 + a_3}{A_1}, \text{ etc.}$$

and let $h_1 = Y(1 - P_1)^2$, $h_2 = Y(1 - P_2)^2$, etc. Having determined the values of h_1, h_2, h_3, etc., from these equations, a point is located on the line separating the areas a_1 and a_2 or this line produced by measuring down vertically from the line *FM* produced a distance equal to h_1. A distance equal to h_2 is measured down vertically from the line *FM* produced on the line separating the areas a_2 and a_3. Similarly a distance equal to each of the values h_3, h_4, etc., is measured down from the line *FM* produced on the respective lines separating the areas a_3, a_4, etc. The points so plotted are then joined together, forming a line from *O* to *M*. If the line so plotted fails to coincide with the assumed line, a second trial is made using the new line in place of the one first assumed and proceeding as before. In this manner a base line *ONM* is found such that when the values of h_1, h_2, etc., are calculated as before but using the new areas a_1, a_2, a_3, etc., above the line *ONM*, the line joining the ends of h_1, h_2, etc., will coincide with *ONM*.

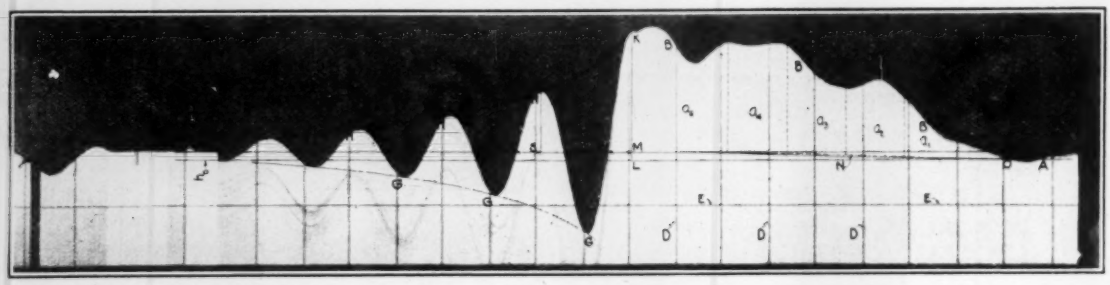

FIG. 8 TYPICAL DIFFERENTIAL PRESSURE-TIME DIAGRAM

10 The area of the diagram delineated by the line *OBBKMN* is called *A* and is a measure of the rate of discharge or quantity of water that was flowing in the conduit at the moment the gates began to close.

In practice it will sometimes be necessary to correct the area *A* for the effect of special conditions or disturbances such as surges in the forebay, gate well, or surge tank at the entrance to the conduit. This is readily done by observing or recording the height and duration of such surges and subtracting a corresponding area from the area *A*. Flow measurements may also be made by obtaining two diagrams similar to Fig. 7 simultaneously at different points along the conduit a known distance apart, the difference between the net areas of these diagrams adjusted to the same scale being used in place of the area *A*. Satisfactory results may also be obtained by using the differential diagram already referred to and illustrated in Fig. 8, which records only the difference in the changes of pressure that occur at two points on the pipe line. In these cases the pipe factor *F* for that portion of the pipe between the two points only will be used.

In the complete paper the principles and theory on which the method is based are examined, as well as the experiments which have been carried out to determine its accuracy in practical cases. In one of the two appendices will be found a complete typical example and a discussion of some of the various factors and special problems which may sometimes require consideration; in the other are given the results of tests made at Cornell University to determine the accuracy of the method.

[1] The neutral line is not always horizontal or coincident with *F*. See numerical example in Appendix No. 1 to the complete paper.

The Margins of Possible Improvement in the Central-Station Steam Plant

By ERNEST L. ROBINSON,[1] SCHENECTADY, N. Y.

The maximum attainable efficiency of the ideal heat engine is discussed, and the circumstances which limit it, in order to point out the various margins available for improvement along different lines. The arrangement of the circulating systems is considered and, after noting the ideal arrangement, practical layouts are taken up. The advantages of the mercury turbine and the steam-extraction cycle are emphasized, and the great increase in capacity rating which has been made possible by purely thermodynamic improvements is noted.

MANY influences are tending to force manufacturers of power to use the greatest care in the layout of their plants in order to obtain the best possible economy of operation. The greatly diversified inventions requiring the use of electricity have much increased the demand for it. Existing plants are more and more pressed to the limit of their capacities and must get the largest output from the available equipment. Increasing costs of coal continually tend to emphasize the importance of the fuel charge in the total costs of operation, and point to the necessity of greater economy in its use. And a sentiment is growing more and more manifest that a high public spirit and the interests of the community require an economical use of natural resources.

It is appropriate, therefore, to take stock of the processes and methods available for improving steam-plant efficiency. The engineering periodicals exhibit a great interest in these questions and a large variety of improvements have been suggested. Usually the authors have devoted themselves to the careful and ingenious application of one or several methods of improving efficiency and have worked out the practical application of their ideas in particular cases. The purpose of the present article is to run over the whole field in a very general way, and to point out the limiting efficiencies attainable and show the lines along which the greatest margins for possible improvement lie. At the outset, then, practical and mechanical limitations will be disregarded in order to go first to the theoretically best economy. Fortunately this may be done in plain engineering language without the use of complicated mathematics. When this has been done it will be appropriate to discuss briefly the various difficulties in the way of going the limit at once. Such speculations bring up very interesting problems in thermodynamical mathematics, which have, nevertheless, been avoided as far as possible.

In the case of any particular installation the correct procedure would, of course, be to start with good practice and make such improvements as can be shown to be desirable. The object of the present paper will have been accomplished if, starting from the more remote ideal, it directs attention to the whole field open for selection and thus enables a more valuable choice to be made as to the best line of development to apply in a particular case.

The Ideal Conversion of Heat Energy

Fundamentally conceived, the steam plant is simply a heat engine for converting fuel into salable power. The textbooks outline certain theoretical facts about heat engines which it is convenient to recall at this time. A heat engine receives heat from a hot source, does work, and rejects heat to a cold receiver. The process of combustion may be considered as the hot source and the condenser as the cold receiver. Heat is directly convertible into other forms of energy at a fixed theoretical rate known as the mechanical equivalent of heat or the heat equivalent of electric energy. If the ideal heat engine could convert all of the heat into work at this rate it would be necessary to reject the working substance devoid of all heat content, that is, at absolute zero. A working substance to carry the heat is of course essential. If, at any time, energy is reclaimed from the working substance, without other heat exchange, its availability to do work has been decreased a corresponding amount, that is, its absolute temperature has been changed. In fact, this idea is the whole basis of the definition of the thermodynamic scale of temperature. Since the temperature of a condenser can hardly be lowered to absolute zero, it is necessary for heat engines in general to do work, even under ideal circumstances, at an efficiency far less than unity. This efficiency is represented by the actual temperature drop of the working substance divided by what the drop might be if all heat were abstracted, that is, the initial absolute temperature. This is the well-known Carnot-cycle efficiency and also the efficiency of any reversible engine.

As this idea of a reversible engine will come up again, it is well to recall it a little more carefully. It really must be the ideal engine because, if any other engine which might be thought more efficient—so that for a fixed amount of work done it has a smaller heat turnover—were used to drive the less efficient reversible engine as a heat pump, such a supposition would enable two isolated machines working together to have a net turnover of heat from a cold to a hot source. Such a condition is contrary to all experience, and the reversible engine with the Carnot efficiency is thus vindicated as the ideal engine. Furthermore, the textbooks go on to show not only that the Carnot efficiency cannot be exceeded, but that any cycle including an irreversible process is necessarily less efficient. An illustration may help to recall this point.

The transfer of heat from a furnace at 2000 deg. fahr. to a boiler at 400 deg. fahr. is an irreversible process. Heat cannot be caused to flow by itself from the boiler to the hotter furnace. As a result of the decrease in temperature the availability of the heat energy in the steam at boiler temperature to do work is very much less than the theoretical availability of the same amount of heat energy in the furnace at the temperature of combustion. On the other hand, if the boiler absorbed the heat of the furnace at furnace temperature, such a process would be reversible, and would enable the steam to work with the higher thermodynamic efficiency which the high temperature would permit. In fact, the idea of availability to do work is synonymous with thermodynamic efficiency, and this idea of loss of availability or thermodynamic efficiency in connection with the irreversible step is the important thing to note at this time. Hence it is well to recall the various types of reversible process.

The Carnot cycle is made up of an isothermal expansion and an adiabatic expansion, followed by an isothermal compression and an adiabatic compression. The isothermal process or heat exchange without alteration of temperature can, of course, be worked either way since no temperature drop is involved. The adiabatic process is reversible because it simply means no heat exchange to the outside at all but simply a conversion of internal or heat energy into external or work energy. Ideally, the isothermal is infinitely slow and the adiabatic is correspondingly sudden in order to be reversible.

There is also the regenerative process in which all heat that passes out of the working substance during cooling is transferred at its own temperature to an auxiliary contraflow substance, so that it may be restored at its own temperature during a similar return process. This requires the infinite slowness of the isothermal and the supposition of a perfect contraflow heater always in contact with the working substance, so that the temperature differences between the working substance and the auxiliary substance are always infinitesimal.

Temperature Limits

Certain very elementary conclusions are possible at once from this review of simple thermodynamic principles. It is desirable to have as cold a receiver as possible, and since there are practical limits to this coldness, it is also desirable to have the source of heat at as high a temperature as possible in order to give the widest possible operating range. These are the things that must be kept in mind when deciding on the efficiency of the ideal process.

With steam as a working substance and modern turbine con-

[1] General Electric Co.

Contributed by the Power Division for presentation at the Annual Meeting, New York, December 3 to 6, 1923, of the American Society of Mechanical Engineers. All papers are subject to revision.

struction it has been found that vacuums corresponding to temperatures between 70 deg. and 80 deg. fahr. are the best that can be obtained with the cooling water available. Of course, it is imaginable that during an Alaskan winter a turbine might be made to exhaust into an air-cooled condenser at a temperature well below 0 deg. fahr. Obviously in such a case the suitability of steam as a working substance would have to be considered in addition to the mere degree of coldness available.

Likewise, at the other end of the process it happens to be far easier to produce high temperatures than to utilize their advantage, because, in the case of steam, the vaporization at a high temperature cannot be accomplished without confinement at an excessive pressure. Thus it is evident that the working temperature range is

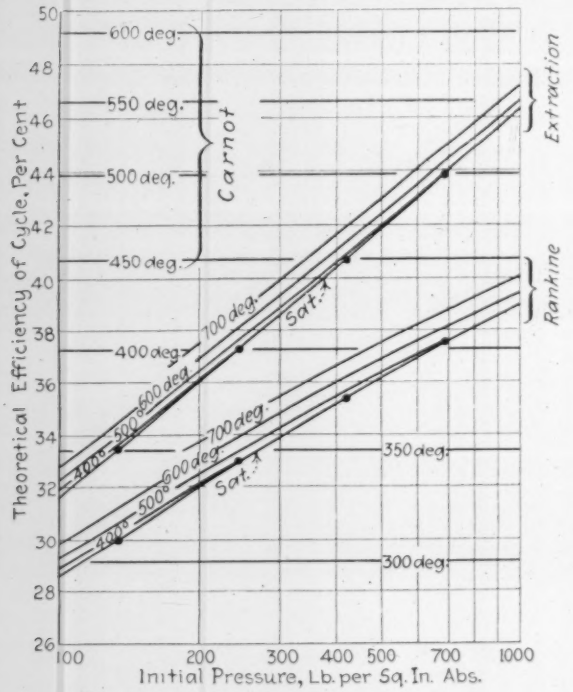

Fig. 1 Theoretical Efficiencies of Steam Cycles
(Based on Goodenough, 1917. Curves are for various initial total temperatures, deg. fahr., as indicated. Back pressure, 1 in. Hg.)

hedged around by various practical considerations which will need special consideration, and this will be given presently.

The Thermal Processes

It is next important to consider the thermal processes and how closely they may be made to correspond with the ideal arrangement, that is, what sort of cycles can be used to the best advantage. It has been pointed out that the thermal processes should be either isothermal, adiabatic, or regenerative, that is, in every case reversible. Beginning at the furnace, the fuel and air are brought together in the presence of heat. Combustion takes place and more heat is liberated. This is absorbed by the boiler and carried to the engine by the working substance. Finally such heat as has not been converted into work is rejected to the condenser. But in addition the burned gases escape up the stack.

The Ideal Furnace

If, for the present, attention is confined to the furnace, it is plain that all the substance, fuel and air, which goes on to the grate and is heated must, in exactly the same quantity, disappear up the stack. Furthermore these substances which start at atmospheric temperature rise to the furnace temperature and then are returned to the atmosphere, eventually cooling to their initial condition. Considering the approach to and exit from the furnace, it is plain that equal quantities of substance rise on the one hand and fall on the other through equal ranges of temperature. This suggests the recovery of all the waste heat of the flue gases by regenerative air preheaters. Ideally, these should be contraflow, with such surfaces and velocities that all the heat of the burned gases is transferred to the incoming air—and fuel also.

Next, considering the process of combustion, it may be regarded as a simple liberation of heat which occurs when the fuel and air are brought into contact at a high temperature. Suppose the fuel to be insulated from the air during preheating until the furnace temperature is reached, when combustion is permitted. Suppose the boiler to be so large that it will absorb the heat of combustion immediately without allowing any appreciable difference of temperature, the working substance being, in the ideal case, at the furnace temperature. This amounts to an isothermal transfer of heat and completes a reversible cycle in the furnace, at least from a thermodynamic point of view. The chemistry of combustion is another question. Still retaining the purely thermodynamic viewpoint, the furnace temperature is ideally arbitrary.

Furthermore, if the boiler is operated at a lower temperature than the furnace, the consequent loss of availability, according to the Carnot efficiency, must be charged against the boiler or its working substance and not against the furnace, since all the heat of combustion would still be transferred to the working substance. On the supposition of a perfect transfer of all the heat of the flue gases to the entering air and fuel, there would be no thermodynamic loss in the furnace, and if, in addition, an isothermal transfer of the heat of combustion to the boiler could occur, then the boiler could be included in the statement.

The Engine. Rankine Cycle not Ideal

Turning now to the working substance in the engine, the steam is the first consideration. It is not necessary to discuss the Rankine cycle for steam. Instead of the adiabatic compression of the Carnot cycle an increase of pressure at constant volume is used, a process which is not reversible. The thermodynamic efficiency has been calculated from the steam tables and plotted in Fig. 1 for dry saturated steam and for various initial temperatures and pressures. A glance at the diagram shows that the higher the temperature, that is, the higher the ideal efficiency, the farther does the Rankine cycle fall short of it.

This is especially true in the case of superheat, even though it improves the actual efficiency. The ideal efficiency rises enormously faster than the change in Rankine efficiency with superheat. With saturated steam the conversion from liquid to steam in the boiler, the expansion in the turbine, and the condensation are all reversible processes, only the process of heating the liquid being irreversible. On the other hand, with superheated steam the absorption of heat is no longer isothermal, so that in this case two out of the four processes which go to make up the cycle are irreversible. Hence it is reasonable that the latter cycle should fall farther below the ideal. Moreover it follows that for any particular temperature the less the superheat the higher will be the efficiency. In fact, for a particular temperature the efficiency is far the best if the pressure is high enough for the steam to be saturated.

The Extraction Cycle

The question now arises as to what cycle can be used in order to cause the steam to turn over the heat in accordance with the best theoretical standards. Obviously, the superheated-steam cycle is far from ideal. In fact, it is hard to justify the use of superheat from a purely theoretical viewpoint, although its application is thoroughly justified by a variety of practical reasons which will be discussed eventually. The Rankine cycle with saturated steam has only one process, the feed heating, which is not reversible. The idea of a regenerative process consists in many small exchanges of heat occurring at successively different temperatures in infinitesimal steps. Suppose the steam-extraction process be pushed to such a limit. It has been called a regenerative process, and this is true.

Suppose steam is extracted from every stage of the turbine and that the number of stages is indefinitely increased. If at each stage just enough steam is extracted to heat the feed the infinitesimal temperature difference, each bit of steam so extracted has gone through a cycle reversible except for the infinitely small temperature drops during the feed heating, and these infinitesimal temperature drops occur in an unlimited number of small steps as in any regenerative process. The boiler temperature can thus be reached within

an infinitely small amount. In other words, the extraction cycle as a whole is entirely reversible in the limit.

In order to understand clearly the truth of this statement, the reversed cycle is traced as follows: Starting with a hot liquid, it is caused by a very small cooling to evaporate a part of itself isothermally at a reduced pressure and that part is compressed adiabatically to the higher pressure and temperature in the boiler where it gives up its heat isothermally and condenses into the hot liquid. Further cooling will evaporate a further quantity at a still lower pressure, and so on. If done in a very large number of steps the process may be rendered as close as desired to truly reversible.

The steam-extraction cycle with saturated steam is thus, in the limit, a truly reversible process with the ideal efficiency of the Carnot cycle. Furthermore the demonstration has assumed only the pressure-temperature relation of a wet vapor. It is good not only for steam, but equally correct for saturated ammonia or saturated mercury. However, it does not apply to the case of a superheated vapor. This is an important fact to understand clearly. The equivalence of the Carnot and extraction cycles was demonstrated in the days of the steam engine before the common use of superheat, and as a result the literature is not clear that the inference is true only for wet vapors and not for superheat. Furthermore it is easy to demonstrate this equivalence analytically on the basis of certain assumed algebraic relations of properties. Such demonstrations, using algebraic relations which are easily shown to be inexact, have failed to command confidence in the conclusion that the extraction cycle really is equal in the limit to the Carnot cycle.

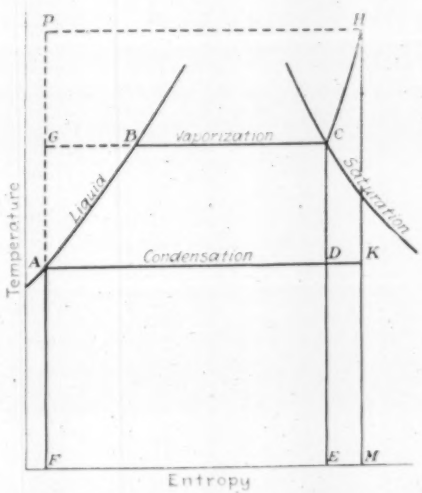

FIG. 2 TEMPERATURE-ENTROPY DIAGRAM FOR RANKINE CYCLE WITH SUPERHEATING

This is about as far as abstract theory alone can go for the steam plant. The furnace and boiler have been imagined ideal by the use of regenerative air preheating with the flue gases, and the turbine has been imagined ideal by using saturated steam and heating the feed to boiler temperature by extraction. Thus the total margins for improvement are shown very clearly in Fig. 1, as explained before. The efficiency of the extraction cycle including superheat has been calculated according to the method outlined in the Appendix. It now becomes necessary to narrow the ideal still further by taking up the practical matters which determine the temperature limits and see what are the relative margins to gain among the various methods of increasing the efficiency. There are two principal questions: First, the temperature limits, and second, for established limits, how to approach as nearly as possible the ideal cycle.

THE UPPER TEMPERATURE LIMIT

The upper temperature limit is determined by the materials of construction rather than by the furnace or the working substance. Turbine materials maintain their strength, roughly speaking, up to 700 deg. fahr. Turbine steels are usually good up to 800 deg. fahr., but the gradient of decrease in strength per degree rise of temperature becomes so steep at higher temperatures that only very low stresses are allowable. Conservative practice therefore places 750 deg. fahr. as the limit at the present time. It has been made clear that, unless saturated steam is used, the efficiency of the process will fall far below the ideal. And with saturated steam these temperatures are above the critical and the pressure above 3000 lb. per sq. in. Both the excessive pressure and excessive moisture during expansion make it undesirable to use saturated steam at such temperatures. The curves for the extraction cycle and the Rankine cycle in Fig. 1 show very plainly the magnitude of this restriction due to the pressure of steam at saturation temperatures. The horizontal lines indicate Carnot efficiencies, and it should be noted that extraction efficiencies and Carnot, efficiencies for particular temperatures become equal at the saturation line.

The temperature-entropy diagram is useful for visualizing the differences in the processes. Fig. 2 shows the Rankine cycle *ABCD*. The heat put in is represented by the area *FABCDE* and the heat exhausted by the area *ADEF*. The Carnot cycle working between the same temperature limits has an efficiency which might be represented by certain areas constructed by drawing the lines *AG* and *GB*. For the same heat exhausted as in the Rankine cycle, the Carnot cycle would have to absorb heat *FGCE* and deliver work *AGCD*. It is plain, therefore, since the extraction cycle is equal in efficiency to the Carnot cycle, that it is represented by these areas, although only as areas, because the broken lines do not represent properties of the substance. Now with the superheated Rankine cycle the work area *DCHK* is added out of a heat addition of *ECHM*. The efficiency is raised because the added work area is a larger ratio of the added heat area than the original efficiency. But the work area of the Carnot cycle for the elevated temperature is represented by the area *APHK*, so that the small addition *DCHK* is a ridiculously unsatisfactory approach. Moreover the constant pressure line *BCH* is no longer isothermal. It is still possible to extract steam and heat the feedwater to the boiler temperature so that the efficiency may be made equal to and even slightly better than the Carnot efficiency for the saturation temperature *GBC*, but the feedwater cannot be heated to the upper temperature limit without encountering the excessive pressures already mentioned. Hence this large area between the saturation temperature and the upper temperature accounts for the failure of the superheat cycle to meet the requirements of an efficiency corresponding to its temperature.

THE ADVANTAGE OF HIGH PRESSURE

It should now be clear why there is a theoretical advantage in the use of high pressures, even though the temperature after superheating is already at the limit fixed by the materials. In order to get the thermodynamic advantage of the highest temperature reached the steam must be generated at that temperature, a process which is practicable only for wet steam and provided that the required pressure is maintained. Thus it is clear that, due to the nature of a vapor, the pressure is quite as important as the temperature. The curves of Fig. 1 set forth the very material rise in theoretical efficiency with increase of pressure at various initial total temperatures, and it should be noted that the increase is still more rapid when steam extraction is employed. These curves have been carried to 1000 lb. per sq. in. absolute pressure. The manner of plotting on a logarithmic base renders the line so nearly straight that extrapolation is easy although it may not be warranted. Even at 1000 lb. per sq. in. the properties of steam are not known with precision. The pressure-temperature relation is, however, well defined and this shows that with saturated steam at 1000 lb. per sq. in. absolute pressure, using the extraction cycle, the efficiency, high as it is, only equals the Carnot efficiency for 542 deg. fahr. and the temperature at the critical pressure itself is only about 700 deg. fahr.

THE BINARY-VAPOR TURBINE

The foregoing all points to the necessity of a substance whose vapor pressure will not be excessive at the temperature to which the materials of construction may be submitted. And this is the great advantage of the mercury turbine. Fig. 3 presents a temperature-entropy diagram for one pound of steam with a similar diagram for ten pounds of mercury drawn at the higher temperatures. In a particular machine the relative amounts of steam and mercury would be slightly different, depending on the temperature of the condenser-boiler. The ten-to-one ratio is convenient for plotting. The low pressure of 45 lb. per sq. in. at 800 deg. fahr. is very satisfactory and the exhaust at one inch of mercury back pressure heats a steam boiler at 400 deg. fahr. and 250 lb. per sq. in. pressure, the steam from which may in turn be expanded to one inch of mercury back pressure. The entire working range of temperatures is from 800 deg. to 80 deg. fahr., and in each case wet vapors

are used. In each case, also, extraction may, imaginably at least, be employed, although the mercury has so little liquid heat, as a glance at Fig. 3 shows, that its Rankine cycle is considerably nearer to ideal than is the case with steam. However, considering the ideal case, a simple scaling from Fig. 1 shows a theoretical increase of economy of the process just described of 37 per cent, as compared with good modern turbine practice using steam at 350 lb. per sq. in. pressure and 700 deg. fahr. temperature, and a saving of 28.7 per cent as compared with the same turbine utilizing the extraction cycle to the limit.

The mercury turbine has thus given a practicable way to reach the upper temperature limit as fixed by the strength of materials. The aim in that direction is now being directed at the materials of construction, and this is entirely correct.

The Lower Temperature Limit

At the other end of the process, the condenser, the temperature limit is fixed by natural conditions. Cooling water sufficient to

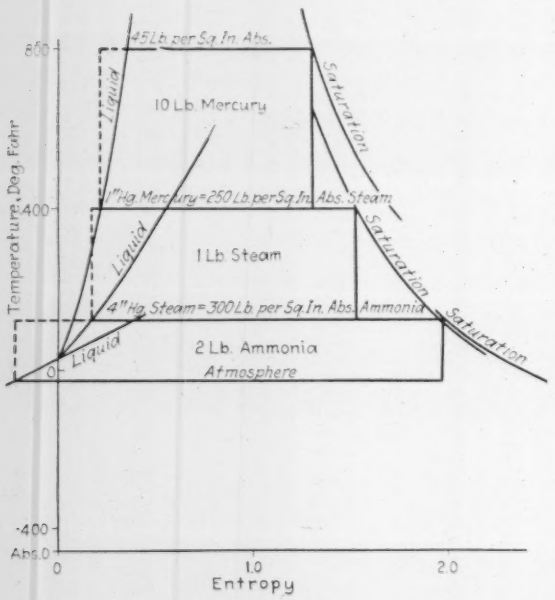

FIG. 3 TEMPERATURE-ENTROPY DIAGRAM FOR A COMBINATION OF MERCURY, STEAM, AND AMMONIA

maintain a vacuum at 80 deg. fahr. is about as good as can usually be expected. However, it is the intention of this paper to look somewhat beyond immediate possibilities in a variety of directions. Fig. 3 also includes the liquid and saturation lines for ammonia, and if a turbine were supposed to be equipped with an ammonia condenser-boiler, then another turbine, an ammonia turbine, might as easily continue the process as the steam turbine continued the mercury process. If such a steam plant were located in the polar regions in winter so that the atmosphere could condense the ammonia at —25 deg. fahr., it would be possible to expand the ammonia to atmospheric pressure. Now if the feed is heated by extraction as in the case of the steam and mercury, the efficiency would be such as to effect a saving of 45 per cent over the case of a steam turbine working with the Rankine cycle at 350 lb. per sq. in. pressure and 700 deg. fahr. temperature.

It may also be noted here that sulphur dioxide could be used with less severe pressures than ammonia. This might be a matter for consideration if the process were adopted, and there is another reason than the efficiency of the process for the use of a refrigerating fluid for the last few stages. The capacity of the compound unit, being dependent on the last wheel of the steam turbine, could be very much increased if the steam expansion were stopped at a moderate vacuum and the remaining energy utilized in one of the suggested refrigerating fluids which have very much smaller specific volumes at the temperatures in question.

The Advantage of Steam Extraction

Having thus discussed what the theoretical efficiency is and how various practical limitations determine what is ideal in any particular case, the next matter to consider is the utilitarian question of the value of the various improvements already instituted. The idea is to take up step by step various limitations that lie between the application of the perfectly general theory and present steam-plant methods. The advantage of the mercury turbine has been pointed out. The theoretical advantage of steam extraction is shown in Fig. 1. The practical advantage depends on the number of heaters. Very roughly it may be said that, in comparison with no feed heating, the use of one heater will realize between a third and a half of the full theoretical gain, and also, very roughly, that each additional heater will realize an improvement about half as large as the last preceding heater added to the system. It remains to discuss the advantage of or reason for superheating, resuperheating, drying, the economizer, air preheating, and the use of auxiliary feedwater heaters.

The Advantages of Superheat

The advantage of superheat, as mentioned before, is almost entirely a matter of practical application due to the limitation of a high initial pressure. The desired temperature cannot be attained with wet steam without incurring too high an initial pressure. Hence the pressure is pushed as high as possible and the slight advantage illustrated in Fig. 2 is realized by superheating. The theoretical value is plotted in Fig. 1 in terms of total temperatures. Fortunately, the use of superheat is attended with a non-thermodynamic improvement in efficiency which is roughly of the same order of magnitude as the theoretical improvement. This is attributed to removal of moisture in the lower stages of the turbine. And still further the greater heat turnover per pound of steam results in an even greater reduction of water rate, which is advantageous in permitting a larger capacity rating of the machine, as will be discussed in another place.

In order to visualize these advantages it may be said, very roughly, that the theoretical gain in economy is about 1.5 per cent for 100 deg. fahr. superheat, while the non-thermodynamic gain is about as much more, making an overall reduction of heat rate in the neighborhood of 3 per cent per 100 deg. of superheat. The reduction in water rate is, on the other hand, of the order of 8 per cent per 100 deg. fahr. However, this must be clearly distinguished from an increase in the economy of operation of the plant. A reduction of water rate does not mean a corresponding reduction in the fuel rate because reductions in water rate usually entail a substantial increase in the heat per pound absorbed by the steam in the boiler.

Resuperheating

The desirability of resuperheating is due largely to the same reasons that apply in the case of initial superheat. But the newness of the process makes it less easy to say what the gain may be beyond the theoretical amount. Fig. 4 shows at a glance that the cycle has been improved, roughly, by nearly the same degree as in the case of initial superheat as compared with saturated steam. The process is accompanied by a further reduction of water rate, as explained before, which is greater than corresponds with the reduction in heat rate. In passing it may be noted that this resuperheating process is a sort of partial expansion under isothermal conditions. For instance, if the resuperheating should take place in each stage, this isothermal expansion might go on to exhaust pressure. There would be a slight additional gain in economy, but the efficiency of the process would not approach the efficiency of the Carnot cycle. The possibilities of practical application to any particular advantage are limited to about one or two steps of resuperheating.

Drying

Drying may be accomplished by the same process as resuperheating, namely, by the addition of heat; but if the addition of heat is only sufficient to dry the steam without superheating it, the gain will be slight and due largely to increased mechanical efficiency in the process of energy conversion. On the other hand, if the drying is done by moisture abstraction, the gain is very appreciable. The moisture removed should be used for feedwater heating, and the practical rise of efficiency due to drier steam in the turbine should be realized. Here again it is impossible to say how much improvement can be realized until the method is put into

practice. On the other hand, steam separators have been used for a long time, and the use of some form of separator in connection with extraction for feed heating would enable the removal of an especially wet sample of steam. In other words, instead of extracting a homogeneous sample, the extraction of all the moisture and only so much dry steam as might be required should enable one extraction drier used for feed heating to accomplish about as much gain in economy as, say, two extraction heaters of the surface-condenser type. This is a very rough statement and depends for its truth on the possibility of satisfactorily operating the drying process.

THE ECONOMIZER

In all that has been said so far, there has appeared no place for an economizer. Indeed, as far as the theory goes, it appears to be anomalous. In considering the ideal furnace it was pointed out that flue-gas heat should be transferred to the entering air, and in considering the extraction cycle the logical source of feedwater heat was seen to be extracted steam. The economizer is intentionally aimed to extend the boiler process to a temperature below that

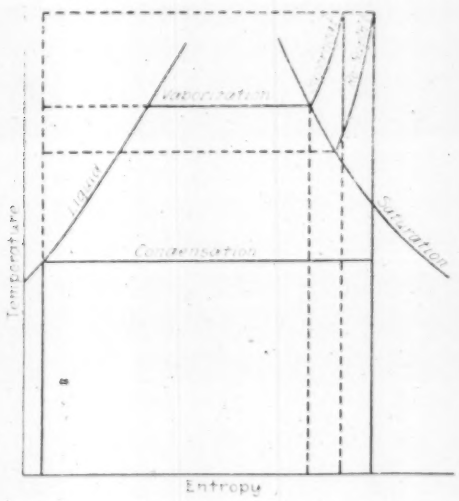

FIG. 4 TEMPERATURE-ENTROPY DIAGRAM WITH RESUPERHEATING

corresponding to its pressure; i.e., to destroy its isothermal nature. But in all these cases where a substantial practice has grown up there is always a good common-sense reason sufficient to justify it at the time. Whether the practice should continue or not is always an appropriate question. The discharge of hot flue gas was a material waste. To pump cold water into a hot boiler was bad. And the transfer of heat from hot gas to water was a practical process well known, since it was taking place in every boiler; hence the economizer.

To secure an exchange of heat between large quantities of air with reasonable temperature differences is not so easy. The design of such apparatus is progressing at the present time, however, and installations of this nature have been made. It is certainly a process theoretically of such distinct value as to warrant serious attempts to accomplish its practical use. On the other hand, the success of this process will not in itself displace the economizer. The economizer works at temperatures roughly between 300 and 600 deg. fahr., whereas grate manufacturers prefer the air to enter the furnace at a temperature less than 300 deg. fahr. or certainly not much more. This is another very real limitation on the realization of the ideal arrangement. The inability to utilize this flow of fluid for returning low-grade heat to the furnace means definitely a corresponding amount of waste. Here is a very good reason for pulverized fuel, if it will permit the use of very hot air going to the fire.

AIR PREHEATING FROM THE ECONOMIZER

There are several alternative methods of connecting up these channels for the return of low-grade heat to the system. In examining them it should be kept in mind that the idea is always to have the heat transfer occur with the least possible temperature difference. That is, the process should be as nearly truly regenerative as possible.

One suggestion that has been made with a view to transferring the heat of the exhaust gases to the incoming air is to fill the economizer with an auxiliary hot-water heating system and pipe this to hot-water radiators in the inlet-air system. Such an arrangement would avoid the bulkiness of air-to-air heaters. But it does not commend itself on account of its complexity, although the contraflow feature of a regenerative process might be utilized at each end. Moreover the water would have to be confined under a very considerable pressure in order to attain the necessary temperature. Such a system would, however, leave the feedwater free to absorb the heat of extracted steam, and perhaps a more suitable auxiliary liquid than water could be selected for the transfer of the heat of the flue gases to the air.

AIR PREHEATING WITH EXTRACTED STEAM

The use of extracted steam for air preheating is another scheme. If the economizer is used at the same time, it will be observed that the recommended arrangements of the ideal process have been crossed. In detail, instead of recovering the low-grade heat by the two regenerative processes, flue gas to air and extracted steam to feedwater, the following processes have been substituted: Flue gas to feedwater and extracted steam to air. This is all right as far as it goes, but examination shows that the crisscross is not equivalent to the direct process. To make this plain it is noted that very roughly two pounds of air flow are required to one pound of water, whereas the specific heat of the air is only about one-quarter as much as that of the water. In the upshot, then, the air circulation can carry back only about half as much heat per degree rise as the water circulation. Moreover the limitation of grate temperature has been noted. It is thus evident that, even if all the air preheating should be done by extracted steam, it would still be desirable to extract more for feed heating.

PARALLEL FEED HEATING

Still another arrangement occurs to the author. The economizer must receive reasonably cold water in order to work efficiently, whereas the extraction process is not pushed to its limit unless it heats the water to boiler temperature. Present arrangements send the feedwater from the heaters to the economizer, thus dividing the available temperature range between the two heating devices. A more efficient way than to divide the temperature rise would be to divide the circulation into two very roughly equal parts (supposing pulverized fuel and no limitation on the air-preheating temperature). One branch of the system would be sent to the economizer as it comes from the hotwell and should enable the cooling of the flue gases to a materially lower temperature than with feedwater already preheated. The other branch of the system should be arranged to receive extracted steam, including appropriate amounts from the high-pressure stages, since these temperatures no longer detract from the action of the economizer. Similar amounts of extracted steam would be used for preheating the air. Such a process in perfect adjustment would approach the ideal process.

THE HOUSE TURBINE

It is now time to discuss the use of a house turbine for feedwater heating. Very simply, if the house turbine has the same efficiency as the main units it is exactly equivalent to single-stage extraction. A house turbine is rarely as efficient as the main units, and generally means a less economical heat rate than extraction from the main units. On the other hand, it has certain advantages in the way of flexible adjustment that cause its use as a so-called "heat-balancer" element. By shifting the load on the house turbine the temperature of the feedwater may be regulated. It would be preferable to control the quantities extracted from the main units.

STEAM AUXILIARIES FOR FEED HEATING

If steam auxiliaries are used for other reasons, the exhaust heat from these may be used for feedwater heating. It is interesting to read descriptions of this common practice which seem to reflect an opinion that it is desirable to create a number of losses in order to have losses to recover. Steam auxiliaries are usually very inefficient as compared with the main unit and therefore not to be compared with motor drive. In consequence the use of such heat is a waste as compared with extraction from the main unit. Furthermore

this heat is rarely added regeneratively but is dumped in at once, so that it reduces the ability to extract other steam more than in proportion to its own value.

The wisdom of having certain auxiliary drives duplicated by steam stand-bys in the interest of station reliability is not disputed at all. But it is maintained that the deliberate layout of a plant to heat the feedwater with such steam on the supposition that it is not lost is wrong because such a layout prevents the use of another arrangement which is more efficient. The heat returned to the system is not lost in itself, but for a given quantity of heat recirculated the auxiliaries can turn less into useful work than the main units. In other words, inefficient auxiliaries should not be placed in a station in order to provide feed heat which may be got from the more efficient main units.

Other Sources of Low-Grade Heat

There are also several other sources of low-grade heat about the station which may be used for feed-heating purposes. Among these may be listed the following possibilities: The exhaust from the turbine high-pressure packings; the heat of the steam air ejectors; the heat of the bearings as recovered from the oil coolers; the generator losses as recovered in the generator cooling-air circulation. In such cases it is perfectly plain that the loss should not be created in order to get the heat. But having the heat it is allowable to use it, especially if it does not hinder the use of other heat. In every case the process should be as nearly regenerative as possible, and the final test of usefulness is the effect on the heat rate of the station as a whole when compared with that of some other arrangement.

The Final Criterion

The importance of considering the station heat rate as a whole is not always appreciated. As soon as the boiler plant and the turbine plant are connected by the regenerative processes the whole station becomes a single thermodynamic unit, and it is no longer possible to judge its economy by considering separately the boiler and the turbine. For example, the economizer may be made extremely efficient at the expense of all feed heating by extraction. Or the reverse may happen so that there is excessive waste in the flue gases. The only safe rule is to look at the heat rate of the whole plant. Furthermore, in accepting such a criterion the electrical apparatus must not be lost sight of, nor the fixed charges. No one would consider for a moment doubling the investment to obtain a one per cent increase in economy, and it is unwisdom of the same sort that focuses attention on any one element of the plant to the exclusion of its effect on the whole.

Capacity Rating

In conclusion, it seems necessary to consider the effect of the various improvements on the capacity of a unit. This relation has been noted repeatedly in passing, and it is a fortunate circumstance that improvements in efficiency usually result in a greater power output from a given amount of working substance and thus tend to increase the rated capacity of a machine. In the case of a particular turbine of large size, the rating depends on the volume of steam passing the last wheel so that reductions of water rate, especially water rate at the last wheel, cause corresponding increases in the rated capacity of the turbine. The reduction of water rate with superheat has been mentioned. A similar reduction occurs with increased pressure. The effect of steam extraction is obviously to reduce the water rate at the last wheel. Recent advances in the rating of single turbine units have brought the importance of this subject to the front, and it seems necessary to point out here the great increase in capacity which theory alone provides in the case of machines using the improvements which have been discussed.

Fig. 5 is a chart of reciprocal water rates or theoretical capacities in kilowatt-hours per pound of steam at the condenser. Curves have been plotted for the Rankine cycle with superheat and for the extraction cycle. Although the specific volume at the exhaust does not vary greatly, very fine lines have been added to show its theoretical value. A comparison with Fig. 1 shows at a glance how much more rapidly the capacity rises than the efficiency. For instance from 130 lb. per sq. in. absolute and saturated steam with the Rankine cycle to 750 lb. per sq. in. and 750 deg. fahr. temperature with the extraction cycle, the capacity is just doubled while the economy is improved one-third. In this example the theoretical specific volume at the exhaust is the same in each case.

In the case of increased superheat at a fixed pressure the capacity rating of the machine increases less rapidly than the capacity per pound on account of the greater exhaust volume. On the other hand, with increased pressure at a constant superheat the capacity rating increases more rapidly than the capacity per pound because of the reduced exhaust volume. Generally speaking, increases of superheat have been accompanied by increases of pressure, so that exhaust specific volumes have been changed very little. It should therefore be plain that the continual increases of turbine rating which have occurred in the past decade without recourse to double-flow or multi-flow construction have been largely due to true improvements in the thermodynamic processes. How much farther such improvements can be successfully carried is still to be seen.

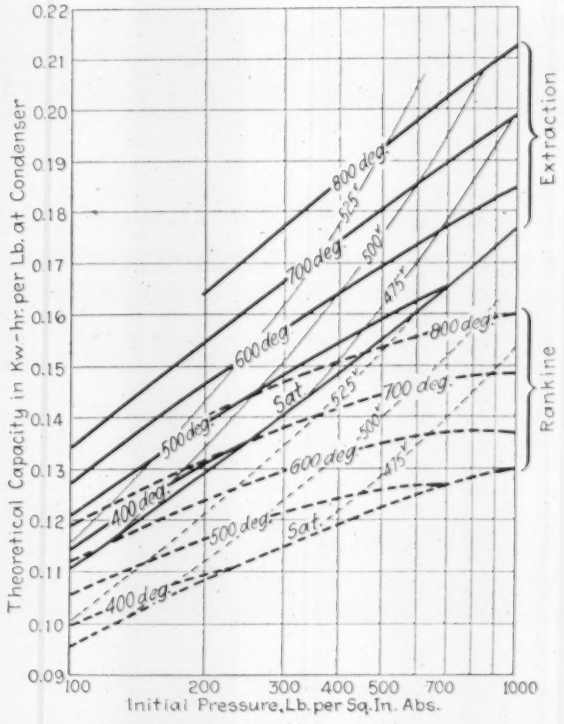

FIG. 5 THEORETICAL CAPACITIES OF STEAM CYCLES

(Curves are for various initial total temperatures in deg. fahr. as indicated. Back pressure 1 in. Hg. Fine lines show exhaust specific volumes in cu. ft. per lb. Based on Goodenough, 1917.)

Appendix

The formulas for calculating the theoretical value of steam extraction as shown in Fig. 1 and Fig. 5 are given herewith. One pound of steam is supposed to go to the condenser. At any pressure during expansion the quantity of working steam is $(1 + w)$ lb. At this pressure the corresponding total heat is H and liquid heat is h. The subscript 1 indicates the initial pressure and 2 the exhaust pressure. The formulas are expressed in terms of liquid heat at any pressure. e is the base of the Napierian system of logarithms.

The heat balance for any particular infinitesimal heater gives the relation:

$$dw(H - h) = (1 + w)dh$$

Integrating, the amount of working substance is:

$$1 + w = e^{\left[\int_{h_2}^{h} \frac{dh}{H - h}\right]}$$

The energy E added to the Rankine cycle per pound of steam in the condenser, which is also the extra amount put in by the boiler per pound of steam in the condenser, is given by integrating the following expression for the work done by the steam going to any particular infinitesimal heater.

$$dE = (H_1 - H)\, dw = \frac{H_1 - H}{H - h}(1 + w)\, dh$$

$$E = \int_{h_2}^{h_1} \frac{H_1 - H}{H - h}(1 + w)\, dh$$

These formulas are used by tabulating or plotting the quantities as functions of the liquid heat. The integration is then performed graphically and the efficiencies and capacities are easily calculated.

Factors in the Spontaneous Combustion of Coal

By O. P. HOOD,[1] WASHINGTON, D. C.

This paper discusses the phenomena incidental to the self-heating of coal when subjected to change in environment and analyzes the effect of the self-heating on the piling of coal. The author states the fundamentals to be observed in storing coal with the minimum danger of spontaneous combustion.

IN ORDER that the engineer may intelligently consider the phenomena of spontaneous combustion of coal, he must receive from both chemist and physicist some general ideas about the coal substance, about the character of coal surface, about the atmosphere in which it may be immersed, and about slow combustion. The coal substance is extremely complex in its chemical relations. Carbon, hydrogen, and oxygen products of fairly definite chemical combination have been brought together in ages past under conditions where rearrangement, exchange, and elimination of elements have progressed at first rapidly and then at rates infinitely slow, until a practical equilibrium has been attained in the substances we find in the ground as coal. Change the surrounding condition, however, and recombinations may begin again. These may be very slow at normal temperatures, but at elevated temperatures they are rapid, and we call the process combustion.

A particle of coal within the mine has for its immediate neighbor a similar particle with which it has exchanged molecules, perhaps, and suffered common losses, until further reaction has practically stopped. This particle, removed from the mine, is surrounded by air from which it had been shielded for ages, and its moisture, temperature, and pressure environment become different.

We should expect considerable variation in coal, since the original vegetation from which it came varied in composition and was laid down in varying proportions, and its environment through the long ages has differed from place to place. Therefore the final equilibrium attained must be different in each case, and we have our anthracite, our bituminous, and our lignite coals.

Atmosphere Reacts with Freshly Broken Coal

When mined it is the freshly broken coal surface that experiences the greatest change and which finds its equilibrium most seriously upset. The boundary between the coal and the air looks smooth, perhaps, but when we apply the conceptions of the chemist the surface must be a jungle in which gas molecules become entangled, condensing on the surface in great numbers. The surrounding atmosphere may carry not only nitrogen and the active oxygen, but also vapor of water and other gases. The temperature will also change. Powdered coal sealed in a bottle with air gradually takes the oxygen of the air into combination, reducing the pressure in the container. Some CO_2 is formed, but not enough to account for all the oxygen. There is slow combustion, as we know it, and other reactions less definite and less stable. Various loosely held oxygen relationships are established on and in the immediate surface. Some coals will take up as much as 6 per cent in weight in this process. Entertaining this point of view it is not surprising, therefore, that there is an attempt to reëstablish chemical equilibrium at the fresh surfaces, and that in these recombinations heat may be given off. Small amounts of heat may be generated in other ways. With the coal substance are minerals, and these also find themselves in strange environment and proceed to change. Heat may be generated from other than chemical rearrangements. If very fine silica sand be slightly moistened with water, heat is generated. There is no chemical change, but the deposition of moisture on the great extent of curved surface in some way generates a small amount of heat.

To sum up, we can expect a fresh broken surface of coal to be chemically active in some way, seeking to establish equilibrum under new conditions. The amount of the activity will vary with the particular coal, the amount of surface, and the environment. It will be rapid at first, and finally be so slow as to pass out of our interest. These changes may develop heat; they may add to the weight, and may finally reduce the weight by inducing combustion. The principal source of heat is the coal substance itself, whatever may be credited to the usually small percentages of associated minerals. Being a surface phenomena it will become noticeable only when the surface is large.

In Changing Environment, Coal is Self-Heating

The rate of these chemical readjustments is greatly increased with increase of temperature. Chemists say that, generally speaking, the rate of chemical combination doubles for each 10-deg. rise in temperature. Coal at ground temperature, when removed, is apt to be sent into warmer surroundings. If the surroundings are such that the heat generated cannot escape, the process becomes self-aggravating, with an increasing acceleration, so that very small heat quantities following this law in time become large. As the temperature rises new reactions also become possible, involving other constituents of the coal substance. J. D. Davis, of the Bureau of Mines, has devised an adiabatic calorimeter which provides an environment for coal which follows exactly the momentary temperature of the coal. Fine coal through which oxygen of the same temperature is made to flow rises gradually in temperature from 150 deg. fahr. until a critical point is reached, when the temperature rise is greatly accelerated. There is an elbow in the plotted temperature curve. This critical point is different for different coals, but is around 185 deg. fahr. In this device coal can be caught in the act of self-heating, rates can be plotted, and comparisons of behavior made.

When a coal surface is elevated in temperature above that of its surroundings it will lose heat by conduction, radiation, and convection. The body of the piece will itself be heated by conduction. Obviously, if the mass is large compared with the surface, as in coarse coal, the rise in temperature of the mass will be small as compared to the condition of fine coal where the total surface is large compared to the mass. Radiation at these small temperature differences is a small factor in the case. Convection is believed to play a considerable part in the problem. Air, vapor, and gas currents normally move across a coal surface, removing heat and carrying it elsewhere, and a temperature equilibrium is soon established at a slight elevation above that of the surroundings. In a pile of coal these movements are usually present. From 25 to 45 per cent of the volume of a pile is void spaces between coal particles, through which a comparatively free movement of air is possible when the pieces of coal are of appreciable size. A light wind pressure would change the air in the pile many times daily. If, however, the particles are quite small although the void percentage may be the same, the resistance to flow of air would be great, and much less exchange of air and heat removal would follow. The ordinary daily barometric and temperature changes produce a breathing in such a pile that would exchange air, and if any portion becomes perceptibly warmer a chimney effect is also possible. These vagrant air movements within a pile are beyond computation, prediction, or practical measurement, but their existence determines largely whether we shall have a dangerous heating in a pile of coal or not. If the movement of air be reduced to zero, the oxygen is soon completely engaged with new relations and the very small rise in temperature is stopped. If there is a considerable movement of air, any heat generated is carried away. There is therefore some rate of air movement too slow to carry heat away but sufficient to keep up the supply of oxygen and produce the maximum heating effect. The problem of coal storage is to prevent this condition, or if it exists, to discover it before a critical temperature is reached, and rearrange and cool the particles at the local point of heating.

Coal Piles Present Peculiar Ventilation Problem

A conical pile of run-of-mine coal made by dumping from one point will have a central core of small-sized particles. Air exchange

(*Continued on page 694*)

[1] Chief Mechanical Engineer, U. S. Bureau of Mines, Mem. A.S.M.E.

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The Mechanical Engineer in the Management of Woodworking Industries

By W. L. CHURCHILL,[1] NEW YORK, N. Y.

The vital need of the mechanical engineer in the management of woodworking industries is depicted in this paper. His knowledge is called for in almost every phase of the industry—from elimination of waste in felling and transporting the timber to the sale of the finished products. The economical arrangement of machinery, the correct handling and caring for lumber, the conservation of man power, the conversion of waste into fuel and power, the design of the product, and many other problems are all within his province. The author believes that the introduction of the properly qualified engineer into woodworking management will place the whole industry upon a more profitable basis, as well as open up a large field of usefulness for the mechanical engineer.

THERE are in the United States alone some 15,000 woodworking firms with $50,000 and over invested in each; there are about 18,000 sawmills with similiar capitalization, and more than 500 logging companies of substantial size. Here are more than 33,000 concerns that need the help and guidance of mechanical engineering principles in their management. A large proportion need and would profit substantially by having mechanical engineers as permanent members of their management staff, and not a few would be wise to secure high-grade mechanical engineers to manage them.

The mechanical engineer in the management of woodworking industries is almost unknown. So rarely is he found in this connection that he usually occasions surprise and wonder as to how he happened to be there and why the responsible power selected him instead of a "practical woodworker." And yet there is no major industry that is more in need of the mechanical engineer in its management functions than the broad class of enterprises coming under the head of woodworking.

This fact when recognized by the mechanical engineering schools and profession will open up a large field of usefulness for the mechanical engineer heretofore comparatively neglected. It will also tend to correct many of the inefficiencies now existing in woodworking operations and place the industry as a whole upon a more profitable basis.

Not only does this field open up a large number of opportunities for the properly qualified engineer, but his introduction into the industry will lift its present low average of earnings to a much more satisfactory level.

A tremendous amount of progress has been made in the development of woodworking machinery, so that today they are marvels of mechanical efficiency and a credit to the mechanical engineering profession for their design and development. This development, however, has been accomplished almost altogether by manufacturers' catering to the woodworking industries, rather than from within these industries. Likewise there have been developed equipment for handling and transporting logs, timber, lumber, veneer, and their products and by-products, as well as for drying, treating, machining, and finishing, that are in every way a credit to the mechanical engineering profession, but in very few instances have these developments been obtained without the aid of other industries or firms furnishing the mechanical engineering talent necessary to place them on a practical and efficient basis.

Waste of Man Power

A typical instance of the result of failure to recognize the importance of having mechanical engineering knowledge in the management is the case of a certain large lumber and lumber-products corporation. The required output of the sawmills was beyond the ability of men to remove and keep pace with sawyers.

A long sorting table was built to catch the lumber as it left the saws and carry it past rows of men stationed to remove it to lumber wagons. Each man removed only a single width and grade of lumber, resulting in a tremendous lot of idle time per man, since the mill cut the timbers as delivered to them in cars of mixed widths. Arranging the delivery to the resaws of timber in separate lots of the same widths reduced the sorters from 26 men to 6 and eliminated the need of some 600 ft. of sorting table.

The engineers called in to design and construct the sorting table had done a good job from the mechanical standpoint, but it required another engineer, trained in the managerial aspects of engineering, to detect the perfectly obvious need of serving the sorting table more intelligently. None of the corps of practical woodworkers on the management staff had observed this opportunity for improving management and reducing costs.

This is by no means an isolated or exceptional instance. It is practically impossible for an engineer to enter any woodworking plant and not observe numerous opportunities for major improvements in methods of production, in arrangement of equipment, in utilization of materials, and even in design of products, all offering additional earnings of substantial proportions

Opportunities for Mechanical Engineers

Wood-cutting machinery is so rapid in its operation that the problem of supplying machines with enough work to utilize their capacity, and the further problems of removing the product, often offer opportunities for the mechanical engineer that enable him to greatly increase plant output and plant profits with comparatively little investment in additional equipment. Few plants devoted to woodworking have their machinery arranged for the most economical production; this problem is peculiarly that of the mechanical engineer and it is not unusual for him to find a large surplus of machinery and of floor space available when he goes into the woodworking plant to improve profits.

In lumber handling and drying there are many opportunities for engineering skill to increase the ultimate yield of merchantable product and earnings as well as to reduce wastes.

Studies of the effects of different methods of piling lumber have disclosed that in this simple operation much material is spoiled or reduced in value because of lack of scientific knowledge of the correct way to care for lumber after it is produced. To the mechanical engineer confronted with the task of handling and caring for lumber, these facts appear perfectly obvious.

In the process of drying lumber the engineer has demonstrated that his profession can be of great value to the woodworking industry. But here again he finds himself on the outside of the industry and obliged to demonstrate the practicability of his ideas at his own expense, and then to sell them to some one willing to prove them out with such modifications as he may see fit to apply. There has been appreciable progress in this field, but the opportunity for further development is one to appeal to the ability of the best of engineers. He should be in a position to carry on this development as part of a management function.

The proper artificial drying of lumber affects every subsequent operation. It has a large bearing on the proper service to customers, cost of production, and even on financing policies. Manufacturers of piano cases, vehicles, and high-class furniture were accustomed in the past to insist upon lumber receiving two years or more of air seasoning before use. Today a large and growing proportion of these manufacturers are artificially seasoning their lumber in two weeks or less, as a result of developments in drying methods largely the outgrowth of engineering research.

The difference between a two years' supply or a few weeks' supply of expensive lumber with the attendant costs for storage space, insurance, spoilage, and loss means a tremendous difference in capital tied up and in the amount of business that can be done on the capital invested. This is only one of the many services that mechanical engineering has furnished to the woodworking industries.

In regard to the allied industry of logging, one engineer who has

[1] Industrial Engineering Service. Mem. A.S.M.E.

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specialized for a number of years in consulting service to lumbermen states that anywhere from 5 to 15 per cent of the available footage of logs is left behind by the wasteful methods of felling and transporting. Although not strictly within the class of woodworking industries these operations are often a part of the larger woodworking enterprises, and the opportunities for the mechanical engineer in their management are not confined to the conservation of the selected logs. The labor of logging is today a challenge to our mechanical engineers for practical mechanical means for reducing the amount of strenuous and dangerous effort now expended for all of the logging operations.

We need mechanical devices and aids for clearing the roads and pathways to the trees to be felled, and for haulage, as well as mechanical means for cutting down and turning the trees into suitable logs for transportation.

Some progress has been and is being made in these directions. If mechanical engineers were interested in the management of the lumber companies this progress would be much more rapid than is now possible, where the engineer is required to work out his ideas independently and then offer his completed device for sale, which is now practically his only means of approaching these problems.

POWER GENERATION

Another phase of woodworking operations that belongs particularly to the mechanical engineer is the question of power generation and distribution. A large proportion of woodworking plants depend chiefly, and many of them entirely, upon their wastes for fuel, with which they generate their own steam for power, heating, and drying purposes. Many purchase no fuel whatever, and not a few even operate refuse burners to dispose of the wastes that are not needed for fuel.

Having much waste to dispose of, it is not surprising that power plants of woodworking industries are notoriously inefficient, and that power distribution is commonly considered from the standpoint of the easiest way to install equipment, rather than how to economize and conserve the power to be used. In some plants, boilers and engines of abnormal excess capacity are deliberately installed because of a supposed excess of available free fuel in the form of waste. It is common to see steam exhausting to atmosphere and the safety valve blowing for hours at a time, all in efforts to consume wastes, using the power and heat generated only as a by-product.

This condition in turn creates carelessness as to insulation of steam lines, dry kilns, etc., that the mechanical engineer interested in the management of these plants must find contrary to his ideas of good management and to present an opportunity to effect economies. However, here he is confronted with the practical woodworkers' logic of "what is the use of economizing on power when you only have that much more waste to dispose of through other means than by burning under boilers?"

Of two woodworking plants operated by the same manufacturer, one operated without purchasing fuel, while the other required the purchase of coal. The superintendent of the latter was criticized for failure to operate his power plant as efficiently as that of the first mill. An investigation of the two plants by a mechanical engineer revealed that the plant purchasing fuel was really the more efficient, for the reason that the other plant was making excessive waste of high-grade lumber. This waste, used as fuel, was the equivalent of coal at $150 per ton.

WASTE

This leads us to what is probably the one factor in woodworking operations that offers the mechanical engineer his greatest opportunity to create large additional profits for the woodworking industries and at the same time to conserve our remaining forests, or at least retard their present rapid rate of extermination. This factor is the factor of waste.

In woodworking the wastes of the major materials used are appalling. They take place at practically every step of the process, from cutting the trees in the forest to final polishing of finished products. These wastes are in large measure inexcusable, and are due to lack of intelligent efforts to prevent them, or to create by-products from them. This is a field where the mechanical engineer should shine preëminently, but he will not find it easy to overcome the inertia of fixed habit in the industry and the general complacency with which these wastes are viewed by those who make them.

Most woodworking concerns will admit that the material they waste, destroy, or throw away, if converted into merchantable products or if reduced in quantity, would add appreciably to their earnings. Many of them will admit that it would make the difference between profit and loss if these wastes could be only partially overcome, yet few will adopt suggestions or experiment intelligently with ideas offered to this end. The reason is that it needs men of engineering instincts and training as managers or supported by the management of these enterprises to attack these problems scientifically to enable their full benefits to be realized.

It is rare to find the engineering type in woodworking enterprises. Therefore progress in this direction is lamentably slow and will so continue until the mechanical engineer is admitted into the industry in its management functions.

In the manufacture and preparation of lumber and veneer for marketing, the planning for maximum values to be obtained from the logs handled can increase the earnings beyond any imagined losses due to retarded production caused by exercising care to insure obtaining greatest possible values from these logs.

The practical woodworker is prone to pride himself on quantities produced and has little ability to visualize the quantities into money. When it is understood that in lumber operations variations in widths and lengths of material obtained from a log create variations of values sometimes as great as 6 to 1 for the same quantity of production, it will readily be understood why the engineering attitude in management of these enterprises is essential to their best returns. The engineer's first concern is for relative values rather than relative quantities. By consideration of this factor alone nonprofitable plants have been quickly placed upon a profit-making basis by engineers.

Operations subsequent to lumber preparation usually call for specific dimensions of materials, and it is in the reducing of lumber and veneers from their log-run dimensions to those specified that the largest amount of wastes are produced.

Figures compiled from a group of more than 50 manufacturers of furniture and furniture parts, veneer and veneer products, disclose that less than two-thirds of all the lumber, logs, and veneers purchased by them leave their plants in the form of merchantable products. The remainder, equal to 50 per cent of their finished products, is burnt up or wasted.

Even crediting at fuel value such wastes as should probably be used for generating steam for heat and power, there is still a tremendous waste of perfectly fine but small-dimensioned stock that can be put to more useful and profitable purposes.

Even most of the lumber ends and edgings of sawmills are suitable for some marketable product, and such as are not, along with shavings, sawdust, etc., should be convertible into pulp stock, or pulp products, chemicals or other materials that can use such refuse in the mass as a base. With the mechanical engineer in the management functions of woodworking industries we should quickly be able to as thoroughly utilize our woodworking wastes as the meat-packing industry, where as the saying goes, everything is saved except the animal's squeal.

There is nothing visionary or even difficult in such a realization, and it will add tremendously to the profit-making possibilities of woodworking enterprises that are now earning altogether too little. It can also reduce in large measure the amount of timber we need to cut for our normal requirements, and conserve our timber resources.

DESIGN OF PRODUCT

Although we have touched briefly on the larger problems of management in which the mechanical engineer can be of most benefit to the woodworking industries, these are not his only opportunities to aid them.

In his generally accepted field of mechanical design and detail he can be of very great benefit especially in manufacturing of furniture and other products retailed to the general public. The structural design of a large proportion of these products today strikes the engineer as being anything but mechanically correct, and many show utter lack of the conception of sound mechanical design. Apparently the principles of bracing, of the truss, and the arch, and proper conservation of materials are almost unknown in the products of wood working establishments. As proof of this it is only

necessary to refer to a series of nationally distributed advertisements now being presented that shows how the simple task of crating furniture and other products can by proper mechanical design of the crates save lumber, freight, labor, and prevent damage to the crated products that together pile up a sizable economy, and justify the engineer for even the simple task of designing wooden packing cases.

It may be offered in objection, that many of our wood products are designed for attractiveness and style, in fact by artists rather than engineers. This does not prevent the use of engineering principles applying to the strength and durability, as these can be effected without sacrifice of symmetry and beauty.

In fact, if engineering design were the first essential, many of our pieces of furniture and other articles of wood construction would be much more attractive than is now the case. Strength and durability call for symmetrical proportions and there is no reason why the artist cannot embellish and decorate articles of correct mechanical design as easily as the architect enhances the appearance of bridges and other structures calling for correct mechanical design first.

Sales

Even the sales problems of many of our manufacturers of wood products would obtain a more satisfactory solution were the mechanical engineer a part of the management function. Too little consideration is given to the effect of sales policies upon the costs of production and their limitations of plant output and ultimate profits.

The engineer is trained to analyze all causes and effects and to forecast and plan for definite results, whether in design and construction of a machine or an organization. The same principles of research and application of established facts pertain to the intangible machine as to the tangible one.

The Engineer and Management

To the mechanical engineer belongs the credit of reducing management to a definite science. The mechanical engineering schools are including in their courses the facts and elements of management science as rapidly as they become defined. Their special application to woodworking industries has not been presented as strongly as the needs of these industries warrant, and this neglect has prevented the engineer from realizing his opportunity just as much as it has prevented the woodworking industries from receiving the benefit of his engineering training.

This condition should be changed. The woodworking industries need help. As a class they are in a deplorable condition. Profits are meager and their products are being supplanted with metal, cement, fiber compounds, paper and other substitutes, in many cases where wood is unquestionably the best material for the purpose. Costs are excessive, quality is getting poorer yearly, and sources of supply of primary materials are being rapidly depleted.

Some of these changes are inevitable and have come to stay. There is, however, much to be done for the industry that will secure for it just recognition of its place, put it on a more stable profitable basis, and eliminate its destructive features. The mechanical engineer is needed in the management of these enterprises in order that their problems may be intelligently solved.

Here is a field that is comparatively unknown to the mechanical engineer, and that hardly knows him. Our problem is to bring them together in mutual understanding of each other. When this is done our rapidly increasing supply of mechanical engineers will be quickly absorbed into a field where they will make as notable improvement as already stands to their credit in lines of metal manufacture and other industries.

When the woodworking enterprises are brought to realize where the mechanical engineer belongs in their industries they will change their present demand for practical woodworkers to a demand for practical profit makers in their management.

The general economic effects of the introduction of mechanical engineering into these industries would be such as to warrant it having a major place in the activities of our society and in those of the Federated American Engineering Societies.

Here is a practically unoccupied country with room for several thousand mechanical engineers and sorely needing them. Just as in any other new country that an engineer might adopt for his residence he will need to adjust his habits, his ideas and even his language to that of the established inhabitants. Where he has been accustomed to working limits of thousandths of inches he here finds one-eighth inch a close measurement.

Here is an industry that is full of tremendous energy and high-speed operations that are in vivid contrast to the slower painstaking motions of metal working, and the engineer who adopts woodworking as his chosen field finds in it a class of men who are quick thinkers, direct actionists, and delightful companions. There is no field where he can hope to be more happily situated, and none where he is more vitally needed, than in the management of woodworking industries.

Spontaneous Combustion of Coal

(Continued from page 691)

through this will be extremely slow. With such handling coal sizes are classified, and will grade from the finest in the center and top to the coarsest on the bottom and lower flanks where there is ample ventilation. Between these extremes, part way up the flanks and below the surface, there is likely to be a most favorable condition for spontaneous combustion, where the coal is fine enough to give a large surface of fresh broken coal and the ventilation too low to carry away the heat and yet sufficient to keep up the oxygen supply. The hazard is thus greatly increased by allowing this classifying action in building the pile.

The part that moisture plays in this problem is of interest. A distinction should be made between the moisture considered by the chemist and moisture as known to the operating man. In the one case water vapor may play a part in the chemical drama, perhaps being necessary to some reactions, and enter into the problem of swelling mineral crystals that break up the coal into finer sizes. To the operating man moisture means something he can see, a heavy rain on a car of fine coal, or perhaps drenching a pile of coal to cool it off. The latter effects are believed to be largely physical and mechanical. Fine coal will hold 15 or 20 per cent of free water, and such coal is practically impervious to air currents. The locomotive fireman wets his fine coal in order that the draft shall not at once blow through the coal. A dry pile which may be sufficiently ventilated may be partially sealed if wet, and reduce the ventilation to a dangerous point. The conclusion often reached is that wet coal fires easier than dry coal, but the conclusion should be that the ventilation was so restricted by an impervious blanket as to furnish favorable conditions for the accumulation of heat. Putting water on a hot part of a pile only seems to furnish a good carrier of heat to other parts of the pile, and to disturb ventilation, unless large quantities are used and the pile drenched. Even here it is possible to have the under part of a large coal piece glowing while a heavy stream of water is shed from the top as from the roof of a house.

Practical Coal Storage

The application of these thoughts to practical coal storage lead to the following conclusions, which seem to agree with best current practice.

There must be no heat added to the coal from outside sources, such as hot walls, steam pipes, oily waste, etc. If coal can be got into the pile in pieces that will stay on a $^3/_4$-in. bar screen there will be no heating. The pile may be of any height provided there be no fines. Where mixed lump and fine coal must be stored the pile should be so built as to avoid segregation of sizes. The production of fresh surfaces by breakage just before going into storage, predisposes to spontaneous combustion unless the crushing is so fine and the packing of the pile so dense as to largely exclude air circulation. Coal should be so stored that its temperature conditions can be daily inspected. When any portion reaches a temperature of 140 or 150 deg. fahr. there is a high probability that within a few days or weeks a destructive temperature will be reached. If the temperature reaches 160 or 180 deg. fahr., there is almost a certainty that a destructive temperature will be reached. The best remedy is to move the warm coal so that it may cool.

The possibility of quick removal should be considered in storing coal. This factor, rather than any tendency to heating, determines the desirable size of pile and its height. The tendency to heat differs in different coals, and experience is so far the best guide in determining this difference.

Notes on the Fatigue of Metals

By J. M. LESSELLS,[1] EAST PITTSBURGH, PA.

IN ALL previously published work on the fatigue of metals in which the results of experiment or theory have been discussed, so far as the author is aware, attempts have been made to show that the endurance limit of a material is related to ultimate stress in tension alone. An exception must be made in the case of Bauschinger, however, who does not subscribe to this theory.

The results of experiments recently undertaken in the Research Laboratory of the Westinghouse Elec. & Mfg. Co. would indicate that this relation is not a simple one and that although the value of the ultimate stress in tension determines in large degree the value of the endurance limit, there are nevertheless other factors involved. These appear to be the microstructure of the material and also the magnitude of the internal stress to which it is subjected. Experimental results will be discussed to substantiate these conclusions.

Experimental Results

The following results were obtained from material drawn from the same heat of steel, the analysis of which was as follows: C, 0.37; Mn, 0.53; Si, 0.028; S, 0.033, and P, 0.013. One bar of this material was machined into test pieces in the rolled condition; another was annealed; a third was normalized, and the others were given heat treatments such that the quenching temperature was the same but the drawing temperature was varied to give different physical values. After treatment these bars were also machined into test pieces. Table 1 gives the tensile-test results obtained

TABLE 1 RESULTS OF TENSILE AND FATIGUE TESTS OF 0.37 C STEEL IN THE PEARLITIC STATE

No.	Treatment	Elastic limit, lb. per sq. in.	Yield point, lb. per sq. in.	Ultimate strength, lb. per sq. in.	Elongation, per cent	Reduction of area, per cent	Ratio $\frac{Y.P.}{E.L.}$	Endurance limit, lb. per sq. in.
1	As rolled	30,000	36,300	75,700	31.4	49.0	1.20	28,000
2	As annealed	34,700	37,000	88,700	32.3	48.0	1.07	28,600
3	As normalized	34,725	39,450	78,800	31.0	48.6	1.13	29,300

from the first three bars, rolled, annealed, and normalized, i.e., pearlitic steel, as well as the endurance values obtained on the same material in a White Souther cantilever fatigue-testing machine,

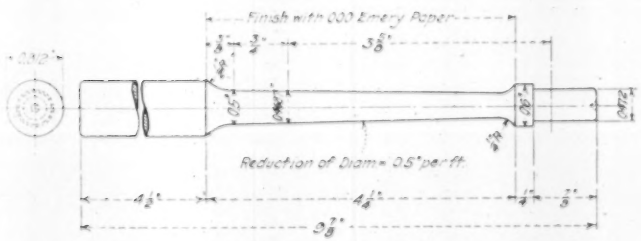

FIG. 1 CANTILEVER TEST PIECE USED IN FATIGUE TESTS

using the test piece shown in Fig. 1. The endurance values were taken from curves such as those shown in Fig. 2, where the endurance limit is that stress which the material will withstand for at least 20×10^6 cycles of stress.

Table 2 gives the tensile-test results obtained from the three remaining bars which received different heat treatments, i.e., sorbitic steel, together with the endurance values for these steels obtained in a manner similar to that previously described.

TABLE 2 RESULTS OF TENSILE AND FATIGUE TESTS OF 0.37 C STEEL IN THE SORBITIC STATE

No.	Treatment	Elastic limit lb. per sq. in.,	Yield point, lb. per sq. in.	Ultimate strength, lb. per sq. in.	Elongation, per cent	Reduction of area, per cent	Ratio $\frac{Y.P.}{E.L.}$	Endurance limit, lb. per sq. in.
4	Quenched in water and drawn	64,600	69,460	105,460	21.8	56.1	1.07	50,000
5		65,600	74,660	114,100	17.7	49.0	1.14	49,000
6		68,000	80,800	116,800	16.4	40.9	1.185	51,000
7		74,000	92,000	130,000	12.4	34.6	1.24	58,000[a]

[a] Troostite present.

[1] Westinghouse Research Laboratory.

Theory from Experiment

It would be well before these results are discussed to review some of the theory of the subject. Examining Gerber's parabolic formula, if

f_e = endurance stress
r = range of stress
F = maximum stress in tension, and
n = constant depending upon carbon content,

$$f_e = \frac{r}{2} + \sqrt{F^2 - nrF}$$

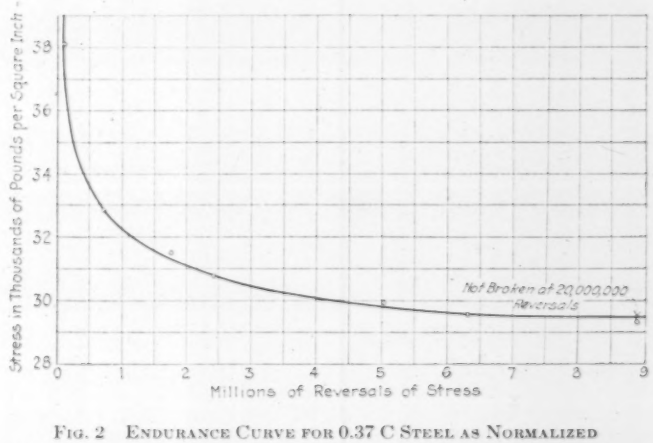

FIG. 2 ENDURANCE CURVE FOR 0.37 C STEEL AS NORMALIZED

and if this stress is completely reversed,

$$r = f_e - (-f_e) = 2f_e$$

$$f_e = f_e + \sqrt{F^2 - 2nFf_e}$$

or

$$f_e = \frac{F}{2n}$$

which indicates that the endurance limit for a given steel is dependent upon the maximum stress in tension alone. This is not now in accordance with experimental results and does not take account of the structure and the magnitude of the internal stress. Considering these influences, experimental results obtained will now be discussed. Steels having the same microstructure will be grouped together, either as pearlitic, sorbitic, or troostitic steels. Moreover, from observations made on various series of tensile-test diagrams it is believed that the ratio x of yield point to elastic limit is a measure of the internal stress in the material. It is a well-known fact that with a perfectly annealed steel (zero internal stress) this ratio is unity, and in a quenched material it is high (high internal stress) as shown by the rounded diagram of elastic extension.

Application of Theory

Taking the material in the rolled state as the basis, then, from Table 1,

$$x_1 = \frac{\text{yield-point stress}}{\text{elastic-limit stress}} = 1.2$$

f_1 = 28,000 lb. per sq. in.
F_1 = 75,700 lb. per sq. in.

whence

$$k_1 = \frac{28,000}{75,700} = 0.37$$

Then, using these data, the endurance limit for the annealed state can be calculated as follows from the tensile-test data:

$x_2 = 1.07$
$F_2 = 68,700$ lb. per sq. in.

whence

$$f_2 = 68,700 \times k_1 \times \frac{x_1}{x_2}$$
$$= 68,700 \times 0.37 \times \frac{1.20}{1.07}$$
$$= 28,500 \text{ lb. per sq. in.}$$

The value of f_2 obtained by experiment, as shown in Table 1, is 28,600 lb. per sq. in.

For the normalized state

$x_3 = 1.13$
$F_3 = 76,800$ lb. per sq. in.

whence

$$f_3 = 76,800 \times k_1 \times \frac{x_1}{x_3}$$
$$= 76,800 \times 0.37 \times \frac{1.20}{1.13}$$
$$= 30,000 \text{ lb. per sq. in.}$$

The value obtained for f_3 in the tests was 29,300 lb. per sq. in.

Taking the material in the No. 4 condition as the basis,

$x_4 = 1.07$
$f_4 = 50,000$
$F_4 = 105,460$
$k_4 = 0.474$

Then, using this as a basis,

$x_5 = 1.14$
$F_5 = 114,100$

$$= 114,100 \times 0.474 \times \frac{1.07}{1.14}$$
$$= 50,600 \text{ lb. per sq. in.}$$
$$= 49,000 \text{ lb. per sq. in. by experiment, Table 2.}$$

Taking the sixth condition,

$x_6 = 1.185$
$F_6 = 116,800$

$$f_6 = 116,800 \times 0.474 \times \frac{1.07}{1.185}$$
$$= 50,000 \text{ lb. per sq. in.}$$
$$= 51,000 \text{ lb. per sq. in. by experiment, Table 2.}$$

Taking the seventh condition,

$x_7 = 1.24$
$F_7 = 130,000$

$$f_7 = 130,000 \times 0.474 \times \frac{1.07}{1.24}$$
$$= 53,000 \text{ lb. per sq. in.}$$
$$= 58,000 \text{ lb. per sq. in. by experiment, Table 2.}$$

The reason why the value of the seventh series does not agree with experiment is because due to the drastic quenching given the material for this series there is troostite present and the value for the constant k will be greater than 0.455. From results available on other steels there is reason to believe that this will become 0.52, in which case

$$f_7 = 130,000 \times 0.52 \times \frac{1.07}{1.24}$$
$$= 58,500 \text{ lb. per sq. in.}$$

which agrees with the experimental value.

Table 3 gives the tensile and endurance values for a chromium stainless steel. In this case it will be noted that the only difference in the tensile-test values is in that of the elastic limit, the values of the yield points being nearly alike and the value of the ultimate stress being actually lower for the second steel. Nevertheless, this second steel is 50 per cent higher in fatigue-resisting properties than the steel designated No. 1.

Applying the theory again to these cases and taking average values from Table 3,

TABLE 3 RESULTS OF TENSILE AND FATIGUE TESTS ON CHROMIUM STEEL

No.	Elastic limit, lb. per sq. in.	Yield point, lb. per sq. in.	Ultimate strength, lb. per sq. in.	Elongation, per cent	Reduction of area, per cent	Endurance limit, lb. per sq. in.
1	21,000	49,000	89,150	24	48.6	32,500
1	36,000	51,600	88,200	23.7	55.2	32,500
2	47,500	51,000	82,800	34.2	66.6	50,000
2	45,000	51,750	83,100	33.2	67.9	50,000

$$x_1 = \frac{50,000}{28,000} = 1.78$$
$f_1 = 32,500$ lb. per sq. in.
$F_1 = 88,500$ lb. per sq. in.
$$x_2 = \frac{51,000}{46,000} = 1.1$$
$F_2 = 83,000$ lb. per sq. in.

therefore

$$f_2 = 83,000 \times 0.367 \times \frac{1.78}{1.1}$$
$$= 49,400 \text{ lb. per sq. in.}$$

which again agrees with the result of experiment.

Certain of the results published by Professor Moore in Bulletin No. 136 of the University of Illinois are given in Table 4. In this case

TABLE 4 RESULTS OF TENSILE AND FATIGUE TESTS ON CARBON STEEL

(From Bulletin No. 136, Univ. of Ill. Engineering Equipment Station)

Steel	State	Elastic limit, lb. per sq. in.	Yield point, lb. per sq. in.	Ultimate strength, lb. per sq. in.	Y. P. Ratio E. L.	Ratio of endurance limit to ultimate strength
0.37 C	As normalized	34,500	34,900	71,900	1.01	0.460
0.52 C		45,500	47,600	98,000	1.05	0.428
0.93 C		28,000	33,400	84,100	1.19	0.363
1.20 C		58,600	60,700	116,900	1.04	0.427

also it will be seen that for steels having the same structure the ratio of endurance limit to the ultimate stress in tension is highest when the ratio of the yield point to elastic limit is the lowest. This again confirms what has been advanced in this discussion.

It is therefore believed by the author that the results he has presented are sufficient justification for the following conclusions; namely,

1 The breakdown of metal by fatigue is very highly localized, as evidenced by micro-examination of a test piece in the region of fracture failing to show an abnormal structure. It is therefore logical to believe that the limiting value of the fatigue stress will be some factor of the maximum stress in tension.

2 In the material examined (0.37 C) the fatigue stress has a maximum value, being higher for the sorbitic and troostitic states than for the pearlitic. It therefore follows that structure has a distinct effect.

3 For a given microstructure the value of the fatigue stress is influenced by the magnitude of the internal stress in the material initially due to the treatment which it has received. The ratio of yield point to elastic limit can be used to define the degree of this stress.

4 It therefore follows that if a tensile-test diagram for the annealed condition is available together with a microphotograph and the experimental value of the endurance limit for that state, then the endurance limits for all such similar microstructures can be predetermined from tensile-test diagrams for these other states.

According to tests carried out at the National Physical Laboratory, a solid gravel concrete wall and a wall of sand-lime bricks transmit about the same amount of heat under the same conditions, but a wall of stock bricks only transmits about three-quarters as much heat. A cavity wall of ordinary type transmits about half to five-eighths that of a solid wall, according to the size of the cavity.—*The Engineer*, Oct. 5, 1923, p. 367.

The Unilateral System of Tolerances

This System Favored by Majority of Firms in the United States Because of Its Economy and Freedom from Confusion

By EUGENE C. PECK,[1] CLEVELAND, OHIO

WHY do we need a national standard system of dimensional tolerances? What part do these tolerances play in the commerce and manufacture of the world?

They are needed for many purposes too numerous to discuss in this brief article, but the most important or primary reason for the use of standard systems of tolerances is to make possible interchangeable manufacture. No discussion of any tolerance system should have recognized weight which does not have interchangeability as its ultimate goal.

The greatest economic use of labor is found in quantity production of mating parts by interchangeable manufacture. This method of manufacture also gives to the consuming public the greatest value for the purchase price and the best service in renewal of repair parts. As a direct result of interchangeable manufacture the cost of many commodities has been brought within the means of the general public, thereby still further increasing the economies to be derived from quantity production.

Interchangeability Defined

There are several degrees of interchangeability. Strictly speaking, interchangeability consists in making the different parts of a mechanism so uniform in size and contour that each part will fit and properly function in any one of the whole number of mating parts, no matter when or where it is made. It will be noted that this definition means that each part of the mechanism of a certain model will fit any of the mechanisms of the same model, regardless of the lot to which it belongs or the year in which it was made. However, as often defined, interchangeability consists in making each part fit any mechanism in a certain series; that is, the interchangeability exists only in the same series.

Selective assembly is sometimes termed interchangeability, but it is merely assembly without fitting. It is used where close work and good fits are desired and consists in selecting by trial the largest internal members and assembling them with the largest external members, thus limiting the freedom of fits and still allowing a reasonable tolerance in machining. The following example will serve as an illustration: If ten 1-in. holes should vary from standard size to 0.001 in. oversize and ten shafts were selected from a lot which gave the desired kind of fit in each pair of mating parts, they would function properly without fitting; but it is evident that the largest of these shafts would not interchange with the smallest holes and give the desired results if good fits were required. Therefore interchangeability by this method is very limited and should be so recognized.

It will be noted that the strict definition of interchangeability given above does not imply that the parts must always be made without hand work, although that is usually considered desirable. It does mean, however, that when the mating parts are finished, by whatever process, they must assemble and function properly, without fitting individual parts one to the other. On this point hinge some of the controversies on interchangeable manufacture and the advisability of its application.

It must be realized that the rapid production of a large number of interchangeable parts such as was demanded during the World War necessitates their manufacture in a number of separated shops. For all of these parts to be within the specified limits for size requires that each shop must first have master gages representing as exactly as possible these limits. To produce a number of master gages which shall be identical within very close limits presupposes the existance of linear standards that are accurate and identical all over the manufacturing world, or else the production of the master gages by a single concern which has accurate standards.

In a pair of mating parts that move freely, there is a space or clearance between the mating surfaces. This space is large or small according to whether the fit is loose or tight. If this space be gradually reduced, a condition will ultimately be reached in which there is no space or clearance between mating surfaces, that is, they fit metal to metal without shake. Then any movement of the mating parts one within the other will require some force, and if the surfaces are accurate and smooth, both members are then of the same size. The dimensions of the parts making this fit should then be regarded as having the exact standard or basic size.

This is the place at which interference of metal begins, often termed the zero point or zero line. Tolerances and allowances are considered as plus above this line and minus if below it.

This zero line is then the place at which interference of metal begins to take place, and it should represent the exact standard or basic value of the dimensions because a correct pair of mating standard gages check the dimensions of a pair of mating parts against interference. This means that the minimum dimension of the external member and the maximum dimension of the internal member of a pair of mating parts that fit without shake are standard or basic. This fit without shake is the most difficult class of fit to make. The standard gages purchased in the open market are the "go" gages for this fit and serve to check for an interference of metal.

Strict interchangeability can be maintained only when the interference of metal between mating parts takes place at a point which bears a fixed relation to the basic or standard dimension. This is so obvious that it scarcely even needs explanation. It must be plain that if every firm agreed that the zero or interference line should be 0.001 in. over basic and worked to this system, universal interchangeability could be maintained. It must be equally plain that if one firm adopted the plan of having the zero line or point at which interference takes place 0.001 in. over basic or standard, another 0.001 in. below basic or standard, and still another at a point exactly agreeing with basic or standard, there could be no strict interchangeability of mating parts among these three firms. Such a condition is exactly analogous to a variation in the values of linear standards. If the American inch was 0.001 in. smaller than the British and 0.002 in. smaller than the French, interchangeability of product among these countries would be lost, even though the workmanship was perfect in each case.

This feature of having the basic or standard gage determine the line at which interference of metal takes place is quite valuable, because these gages alone will check product against interference and the mating parts are bound to go together. It should be noted that there is a very large amount of work made all over the country in which fits are not essential but the parts *must go together freely*. Therefore for this interchangeability and the maintenance of nominal-sized product it is a great advantage to be able to inspect against an interference with a set of standard basic gages.

Two Tolerance Systems Compared

It seems impossible to put too much emphasis on the basic or fundamental fact that where interchangeability is desired there must be a fixed and unchanging point in relation to the basic or standard at which the interference of metal takes place. The master gages or standard gages of nominal sizes ordinarily available everywhere conform to the fundamental condition that they are produced under ideal conditions and are identical within any limits now being discussed. A system dependent directly on these standard gages for checking the wear limit of the "go" gages is inherently superior to one dependent on another set of master gages whose limits are at variance with the standard gages of nominal size.

The Unilateral System of tolerances complies exactly with this basic principle, while the Bilateral System violates it.

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Strict interchangeability demands control of the dimensions of the minimum external and maximum internal members. If the interference of metal is intentional, as in tight fits, control of these two dimensions is also the important factor as well as in free fits in order to prevent the assembly of mating parts that are too tight. There should be no confusion or misunderstanding in regard to the assembly of mating parts by interchangeable manufacture—the parts will assemble and function when no external member is smaller than the prescribed limit, and no internal member is larger than the prescribed limit. No gaging system can be set up, however, which depends on the use of worn gages, because gages do not wear uniformly in either size or contour and hence cannot control either of the limiting dimensions when worn. It is a delusion to think that either on account of gage wear, gage tolerance, or for any other reason, the zero point can be crossed without destroying practical and economical interchangeability.

For analysis and comparison consider a hole made for three classes of fit: snug, 1.000 in. ±0.0005; free, 1.000 in. ±0.001; loose, 1.000 in. ±0.002, as dimensioned by the Bilateral System. A glance indicates immediately three minimum as well as three maximum holes. The zero point or interference of metal takes place respectively 0.0005 in., 0.001 in. and 0.002 in. below the basic size of 1.0000 in. This will require three "go" gages none of which are basic, all being special. The resulting pieces if made in large quantities will have to be stored separately to obtain the kind of fit desired and to prevent an interference of metal with shafts made for a higher grade of work.

The limit gages used in this system cannot be handed down to the next succeeding poorer grade of fit without refinishing because they will be worn to a taper. There will also be the cost of remarking them for the new class of fit. The same may be also said of the solid reamers. From the largest solid reamer that could be used to the smallest for all three fits, before it is thrown away, there is a wear of 0.004 in. under ideal conditions.

Using the same example but the Unilateral System of tolerances, the hole dimensions become:

$$\text{Snug Fit, 1.000 in.} \begin{matrix} +\ 0.001 \\ -\ 0.000 \end{matrix} \qquad \text{Free Fit, 1.000 in.} \begin{matrix} +\ 0.002 \\ -\ 0.000 \end{matrix}$$

$$\text{Loose Fit, 1.000 in.} \begin{matrix} +\ 0.004 \\ -\ 0.000 \end{matrix}$$

We have at once one uniform minimum hole and that is basic 1.0000 in. The Standard 1 in. plug is the "go" gage for all three classes of fits. The interference of metal takes place at the same unvarying zero point, the basic dimension. There is required one standard gage for the "go" gage which can be bought in the open market, for all three fits as against three special "go" gages for the Bilateral System. There is, however, no difference in gage cost in either system for the "not go" gages.

In manufacture the holes are quite commonly and may well be made with the same tools; inspection will pass, in either system, all holes which the "not go" gage for the snug-fit class will not enter.

In the Unilateral System if the same "go" gage accepts all of these pieces as well, every one of them can be used for interchangeable assembly for any one of the three classes of fits without further classification. In the Bilateral System three inspections with three different "go" gages will have to be made and the holes belonging to each class of fit kept separate with the attendant trouble and losses. It is claimed by the opponents of the Unilateral System that this method of inspection will pass more pieces by the Bilateral System, but this is not true as a little thought will show. The machining ability of the operator being equal in each case, the same number will be passed by each system as the extreme tolerance limits are the same, 0.004 in. in each case.

The wear life of a tool depends, all factors being equal in each case, on the amount the tool is over the minimum hole size at the beginning of its life, and not on the relation of the size to the basic or standard. It is the practice in the United States to make all solid reamers slightly over basic for wear life, and not exactly standard, as some engineers suppose.

In interchangeable manufacture in the United States it is the predominating practice to use adjustable reamers, returning them to the toolroom for correction as soon as the standard plug gage will not enter the holes. Years of experience have made plain that this procedure maintains accuracy and quality of holes at a low cost, at the same time makes possible the transfer of the skill of a good toolmaker through the toolroom to the machine operators, and best of all provides for strict interchangeability.

Indicating Tolerances

It will now be shown that the work of dimensioning and revising tolerances on drawings is less for the Unilateral System, requires less mental effort, and therefore tends toward economy and accuracy.

It is almost universally agreed that *allowance* or minimum clearance is a designer's term and from his standpoint the important factor in a fit. This is certainly true if the designer is really competent, and as he is responsible for the proper functioning of the mechanism he has a right to insist on the accepted fundamental, namely, that allowance (neutral zone or minimum clearance) must never be encroached upon from any cause.

The important factor, from the manufacturing standpoint, is the *tolerance* allowed.

Thus allowance and tolerance are each required by two different parties, sometimes so widely separated as to never even see each other. They must not therefore be confused nor tampered with by the wrong party or trouble will ensue.

To illustrate, let it be assumed that a designer desires a hole with a free-running shaft and has decided that an allowance of 0.001 in. is sufficient. That is, he will make the hole 1.000 in. standard and the shaft 0.999 in. This represents his ideal condition of this pair of mating parts for the job intended. If he plans to make only one pair, this is all that is necessary and the toolmaker could make the parts without trouble. This establishes the fact that 0.001 in. is the clearance between the mating surfaces of this pair, and this is the minimum requirement.

Suppose, however, it is desired to make, say, 10,000 of these pairs and it is decided to allow 0.001 in. tolerance on each member. The dimensions then become (by the Unilateral System):

$$\text{Hole, 1.000 in.} \begin{matrix} +\ 0.001 \\ -\ 0.000 \end{matrix} \qquad \text{Shaft, 0.999 in.} \begin{matrix} +\ 0.000 \\ -\ 0.001 \end{matrix}$$

It will be seen from the above that the main dimensions show at a glance what is the allowance, or the tightest fit. Attention is also called to the fact that these main dimensions also represent what is commonly called "maximum metal." Increasing the metal in either member will make a tighter fit than is permissible. This, then, should be the rule for dimensioning drawings: Main figures indicate maximum metal or tightest fit permissible.

Tolerance should always be applied in a direction to produce greater looseness of fit, as this is the only sacrifice that can be permitted for variation in manufacture.

If for any reason tolerances must be changed, a single dimension only for each member need be altered and the tightest fit is not interfered with. It will be noted that changing the tolerances on either of these members permits the use of the same "go" gages without change.

In the Bilateral System the designer, having established his tightest fit at the same dimensions, i.e., hole 1.000 in., shaft 0.999 in., applies the tolerance to the hole 1.000 in. ± 0.0005 in. and this establishes his minimum hole as 0.9995 in., from which he subtracts 0.001 in. for his allowance. This gives him the maximum shaft 0.9985, from which he again subtracts his 0.001 in. tolerance, arriving at the minimum shaft as 0.9975 in. He may dimension these parts several ways thus:

$$\text{Hole} = 1.000 \text{ in} \pm 0.0005 \text{ in.} \qquad \text{Shaft} = 0.999 \pm 0.0005 \text{ in.}$$

$$\text{or Hole} = \begin{cases} 1.0005 \text{ in.} \\ 0.9995 \text{ in.} \end{cases} \qquad \text{Shaft} = \begin{cases} 0.9985 \text{ in.} \\ 0.9975 \text{ in.} \end{cases}$$

$$\text{or Hole} = 1 \text{ in.} \pm 0.0005 \text{ in.} \qquad \text{Shaft} = 1 \text{ in.} \begin{matrix} +\ 0.0015 \text{ in.} \\ -\ 0.0025 \text{ in.} \end{matrix}$$

In none of these can the tightest fit be determined without considerable mental effort. Changing the tolerances on the hole means changing one dimension by the first and third method of dimensioning, two by the second method. Changing the tolerance on the shaft when the hole has been changed as well, means changing two dimensions regardless of which of the three methods are used, with

the attendant extra care and chance for error. Attention is also called to the fact that changing the tolerance destroys the old zero point at which interference of metal takes place and sets up a new one which may in many cases prevent the assembly of parts previously accepted. Such a change would plainly destroy the assurance that renewals would fit the original parts. It should be noted also that both the "go" and "not go" gages for each member are no longer acceptable under the new dimensions, but must be retained for use in making repair parts for those mechanisms made before the tolerances were changed.

SUMMARY

The experience of the writer, covering thirty years of active work in connection with both the making and the use of tools for accurate manufacturing by all of the systems in use during that time, leads him to believe beyond question that the Unilateral System of tolerances has the following proven advantages:

a It provides the only practical means of maintaining strict interchangeability in manufacture.
b It is more economical to manufacture by this system due to its simplicity.
c The gage cost is less.
d The cost of dimensioning drawings is less.
e The mental effort of dimensioning drawings is less.
f Tolerances may be changed without destroying the zero point at which interference takes place. Changing the position of this zero point may prevent the assembly of parts already made.
g Permits the standard calibrated gage to settle any controversy regarding the interference of metal between mating parts.
h Permits the standard calibrated gage to control the minimum dimensions of the external member.
i Simplifies the handling of small tools and gages in the toolroom.

BASIC HOLE OR BASIC SHAFT

There seems to be some confusion in the minds of many concerning the relation between the adoption of a standard tolerance system and the decision as to which of the two mating parts should be considered basic. Or in other words, which side of the zero line the tolerance for a free running fit should be placed.

If the allowance is taken from the shaft or internal member, the minimum hole becomes basic. If, on the other hand, the allowance or neutral zone is obtained by removing various amounts of metal from the hole or external member, the maximum shaft becomes basic.

In the writer's opinion there has been altogether too much controversy over basic hole and basic shaft. As a matter of fact there are conditions under which both the hole and shaft are basic and there are conditions under which neither of them is basic.

It must be understood that neither shafts nor holes can be made in quantity without a tolerance. This being true, there can literally be no basic hole or basic shaft. However, as shown in the preceding part of this article, in the actual fit of metal to metal both hole and shaft are basic. In all of the other fits the minimum hole only is basic, the tolerance permitting the holes to be above basic.

It is believed that in the foregoing part of this article it has been shown that the most economical practice and true interchangeability are best obtained by having the interference of metal take place at the basic dimension. This, then, seems to be the governing point, and there is only one exception to the universal application of this rule. This exception is transmission shafting or its equivalent, in which a commercial article is used in a way that requires a variety of fits on the same member. This forms a special case in which the holes may well be made to suit this uniform internal member.

However, standard shafting is now and has always been intended to be made to the basic size with the tolerance minus, and this practice does not entirely substitute basic shaft for basic hole, because some of the shafting will be undersize on account of using the tolerance, and hence will produce a more or less free fit. The shafting never being over basic means that a drive fit could only be made with a hole smaller than basic, hence this part of the manufacture would involve a slightly special case. This special case need not, however, interfere with the general standard system as outlined above, because it belongs in a class of machinery slightly divorced from the manufacture of interchangeable machine parts.

The writer's opinion is that the sooner basic hole or basic shaft is forgotten the sooner we can get down to a usable and workable system.

Made-to-order material including fits is not to be confused with the interchangeable product previously referred to. Made-to-order fits can only be made to the dimensions given or to fit a sample submitted. These, then, belong to no system of fits or tolerances and it matters little whether the shaft or hole is basic.

The great bulk of manufactured mating parts are most economically made, and interchangeability is best maintained when the minimum hole is basic and the interference of metal begins at this basic dimension.

Standard Tolerances and Allowances for Machined Fits

First Report of Sectional Committee on the Standardization of Plain Limit Gages for General Engineering Work Now Before the Sponsor Body for Approval

AT THE present time much thought is being given to this subject by the manufacturers of Europe and the United States. The report of this Sectional Committee will accordingly be received with considerable interest.

This Sectional Committee was organized under the procedure of the American Engineering Standards Committee in the Spring of 1920 by The American Society of Mechanical Engineers acting as the Sponsor body. The Committee is headed by E. C. Peck as chairman and H. W. Bearce as secretary, and the scope of this project as published by the A. E. S. C. is "The standardization of the nomenclature and classification of cylindrical machine fits, including allowances and tolerances, for interchangeable manufacture classification, and fixing of standard tolerances for plain limit gages; methods of gaging these classes of fits."

It is obviously impossible for us to reproduce in "Mechanical Engineering" the complete report of the Sectional Committee. We are, however, printing the entire text of the report and three of the tables to indicate the complete way in which this Committee now presents the results of its three years' study. The report having been unanimously approved by the members of the Committee, is before the Sponsor for approval and submission to the A. E. S. C. After such approval it will be published in pamphlet form, and it is hoped that these pamphlets will be ready for distribution shortly after the first of the new year. Those desiring copies should apply to The American Society of Mechanical Engineers.

Standard Tolerances and Allowances

INTRODUCTORY

The Committee on Plain Gages for Engineering Work believe that the terms and definitions used should, as nearly as possible, conform to those in common use. The coining of new terms should be avoided as far as possible, and, where a choice of terms is available, weight should be given the term being the most significant or subject to the least misconstruction. With these ideas in mind, the following fundamentals and definitions have been adopted.

FUNDAMENTALS

Direction of Tolerance on Gages. 1 The extreme sizes for all plain limit gages shall never exceed the extreme limits of the part being produced. All variations in the gages, whatever their cause or purpose, shall bring these gages within these extreme limits. Thus a gage which represents a minimum limit may be larger,

but never smaller, than the minimum size specified for the part being produced; while the gage which represents a maximum limit may be smaller, but never larger, than the maximum size specified for the part being produced.

2 Temperature at Which Gages Shall Be Standard. This Committee recommends the use of 68 deg. fahr. (20 deg. cent.)

3 The final result sought by gaging is interchangeable manufacture in some degree. This means that the parts of a mechanism can be assembled without *fitting* one part to another and when assembled the mechanism will function properly.

4 Applied to manufactured material, the result sought is sufficient uniformity in size and contour to adapt the material to the requirements of the industries without further fitting. The fundamental principle involved in interchangeable manufacture requires that "a system of standardization and classification of fits must establish a clearly defined line at which interference between mating parts begins." Hence,

(*a*) The standard or basic size, as physically represented by a correct standard master gage, represents the line at which this interference begins between mating parts.

(*b*) It is the minimum size of the external members of all mating parts of standardized practice, regardless of the kind of fit.

(*c*) It is the maximum size of internal members of all mating parts where interference begins or that fit metal to metal.

The condition of (*b*) and (*c*) is represented by a mating pair of correctly fitting standard gages.

(*d*) The limits of the component as physically represented by the limit master gages must never be exceeded as a result either of error or wear of the gages.

(*e*) "Go" gages or the equivalent verification of all the factors involved in the fit are necessary to prevent interference of mating parts.

In the case of force fits, "go" gages are necessary to determine the maximum amount of interference between mating parts.

(*f*) "Not go" gages or the equivalent verification of the determining factor is necessary to prevent the maximum looseness of mating parts exceeding the limits specified.

In the case of force fits, "not go" gages are necessary to determine the minimum amount of interference between mating parts.

DEFINITIONS

1 *Gaging.* A process of measuring manufactured material to assure the specified uniformity of size and contour required by the industries.

2 *Gage.* A device for determining whether or not one or more of the dimensions of a manufactured part are within specified limits.

(*a*) *Ring Gage.* One with inside measuring surfaces circular in form. The measuring surfaces may be cylindrical or conical. The exterior shape or form of the gage is immaterial.

(*b*) *Plug Gage.* One with outside measuring surfaces arranged to verify the specified uniformity of holes. A plug gage may be straight or tapered and of any cross-sectional shape.

(*c*) *Receiving Gage.* One with inside measuring surfaces arranged to verify the specified uniformity of size and contour of any piece of manufactured material.

(*d*) *Indicating Gage.* One that exhibits visually the variations in the uniformity of dimensions or contour, the amount of the variation being measured by a graduated scale or by marks, such as, dial, lever, flush-pin, plunger gages, etc.

(*e*) *Snap Gage.* A fixed caliper with inside measuring surfaces for measuring diameters, lengths, thicknesses, etc.

(*f*) *Caliper Gage.* One which for internal members is similar to a snap gage, and for external members is similar to a plug gage.

3 *Standard.* A fixed physical value defined by the Government, such as the yard and meter.

4 *Standard Sizes.* A series of subdivisions of the yard and meter having correct values.

NOTE: The industries by common consent have chosen several different series important for interchangeable manufacture and when they have the correct value they are commonly called standard sizes. Such as: 1/8 in., 3/16 in., 1/4 in., 5/16 in., etc.

5 *Nominal Size.* A name given to the subdivision of the unit of length having no specified limits of accuracy but indicating a close approximation to a standard size.

6 *Basic Size.* The exact theoretical value from which all variations are made.

7 *Allowance.* A difference in dimensions of mating parts, the limits of which are prescribed. It is to provide for different kinds or classes of fits. It represents maximum tightness or minimum looseness.

EXAMPLE: A shaft dimensioned 0.874 in. and a hole dimensioned 0.875 in. represents an allowance of 0.001 in. Using the same hole with a shaft dimensioned 0.876 in. represents an allowance of 0.001 in. also, but, as the shaft is larger than the hole, this allowance becomes a negative quantity.

8 *Tolerance.* A definite difference in the dimensions prescribed in order to permit variations in manufacture. It is equal to the difference between the maximum and minimum sizes.

NOTE: In the example under Allowance, the ideal condition has been given and the tightest fit permissible; but in manufacturing large numbers of pieces these sizes could not be produced exactly, so variations must be made that will not prevent their proper functioning but will enable them to be produced. These variations must therefore tend toward greater looseness. Therefore, if a manufacturing tolerance of 0.001 in. is required on each member, they would be dimensioned as follows:

Shaft	0.874 in.	+	0.000 in.
		−	0.001 in.
Hole	0.875 in.	+	0.001 in.
		−	0.000 in.

This defines a condition in which the greatest looseness in 0.003 in. and the greatest tightness is 0.001 in.

9 *Neutral Zone.* A space between the mating parts which is not to be encroached upon.

10 *Limits.* The extreme dimensions which are prescribed to provide for variations in fit and workmanship.

11 *Master Gage.* One whose gaging dimensions represent as exactly as possible any physical dimension of the component. It is the gage to which all other gages and all dimensions of manufactured material are finally checked or compared, either by direct check or comparison.

(*a*) *Reference Gage.* A commonly used name for master gage.

(*b*) *Check.* Another commonly used name for master gage.

(*c*) *Standard Master Gage.* Any master gage whose gaging dimensions have the standard or basic value of an established nominal size. The legal authenticity of a standard master gage should be established by having its deviations ascertained by the Bureau of Standards at Washington.

(*d*) *Limit Master Gages.* Gages which represent as nearly as possible the exact limiting physical dimensions of the manufactured material as established by the specified tolerances.

12 *Inspection Gages.* Gages for the use of the manufacturer or purchaser in accepting the product. They must not accept any product which the master gages will reject.

13 *Working Gages.* Gages used by the manufacturer to check the work as it is produced. They should not accept any product which the inspection gages will reject.

Classification of Fits

The following classification of fits is recommended:

Loose Fit (Class 1). This fit provides for considerable freedom and embraces those fits where accuracy is not essential.

EXAMPLES: Machined fits of agricultural and mining machinery; controlling apparatus for marine work; textile, rubber, candy, and bread machinery; general machinery of a similar grade; some ordnance material.

Free Fit—Liberal Allowance (Class 2). For running fits with speeds 600 r.p.m. or over, and journal pressures of 600 lb. per sq. in. or over.

EXAMPLES: Dynamos, engines, many machine-tool parts, and some automotive parts.

Medium Fit—Medium Allowance (Class 3). For running fits under 600 r.p.m. and with journal pressure less than 600 lb. per sq. in.; also for sliding fits; and the more accurate machine-tool and automotive parts.

Snug Fits—Small Allowance (Class 4). This is the closest fit which can be assembled by hand and necessitates work of considerable precision. It should be used where no perceptible shake is permissible and where moving parts are not intended to move freely under a load.

Wringing Fit—No Allowance (Class 5). This is also known as a

TABLE 1 LOOSE FIT (CLASS 1)

Diameter			Limits				Tightest Fit	Loosest Fit
From	Up to and Incl.	Mean	Hole		Shaft		Allowance	Allowance + Tolerances
			+	−	−	−	+*	+*
0	3/16	1/8	0.001	0.000	0.001	0.002	0.001	0.003
3/16	5/16	1/4	0.002	0.000	0.001	0.003	0.001	0.005
5/16	7/16	3/8	0.002	0.000	0.001	0.003	0.001	0.005
7/16	9/16	1/2	0.002	0.000	0.002	0.004	0.002	0.006
9/16	11/16	5/8	0.002	0.000	0.002	0.004	0.002	0.006
11/16	13/16	3/4	0.002	0.000	0.002	0.004	0.002	0.006
13/16	15/16	7/8	0.002	0.000	0.002	0.004	0.002	0.006
15/16	1 1/16	1	0.003	0.000	0.003	0.006	0.003	0.009
1 1/16	1 3/16	1 1/8	0.003	0.000	0.003	0.006	0.003	0.009
1 3/16	1 5/16	1 1/4	0.003	0.000	0.003	0.006	0.003	0.009
1 5/16	1 7/16	1 3/8	0.003	0.000	0.003	0.006	0.003	0.009
1 7/16	1 9/16	1 1/2	0.003	0.000	0.004	0.007	0.004	0.010
1 9/16	2 1/16	2	0.003	0.000	0.004	0.007	0.004	0.010
2 1/16	2 7/16	2 1/4	0.003	0.000	0.004	0.007	0.004	0.010
2 7/16	2 13/16	2 1/2	0.003	0.000	0.005	0.008	0.005	0.011
2 13/16	3 5/16	3	0.004	0.000	0.005	0.009	0.005	0.013
3 5/16	3 13/16	3 1/2	0.004	0.000	0.006	0.010	0.006	0.014
3 13/16	4 5/16	4	0.004	0.000	0.006	0.010	0.006	0.014
4 5/16	4 13/16	4 1/2	0.004	0.000	0.007	0.011	0.007	0.015
4 13/16	5 1/2	5	0.004	0.000	0.007	0.011	0.007	0.015
5 1/2	6 1/2	6	0.005	0.000	0.008	0.013	0.008	0.018
6 1/2	7 1/2	7	0.005	0.000	0.009	0.014	0.009	0.019
7 1/2	8 1/2	8	0.005	0.000	0.010	0.015	0.010	0.020

* (+) denotes clearance or amount of looseness.
NOTE: All dimensions in inches.

TABLE 2 FREE FIT (CLASS 2)

Diameter			Limits				Tightest Fit	Loosest Fit
From	Up to and Incl.	Mean	Hole		Shaft		Allowance	Allowance + Tolerances
			+	−	−	−	+*	+*
0	3/16	1/8	0.0007	0.0000	0.0004	0.0011	0.0004	0.0018
3/16	5/16	1/4	0.0008	0.0000	0.0006	0.0014	0.0006	0.0022
5/16	7/16	3/8	0.0009	0.0000	0.0007	0.0016	0.0007	0.0025
7/16	9/16	1/2	0.0010	0.0000	0.0009	0.0019	0.0009	0.0029
9/16	11/16	5/8	0.0011	0.0000	0.0010	0.0021	0.0010	0.0032
11/16	13/16	3/4	0.0012	0.0000	0.0012	0.0024	0.0012	0.0036
13/16	15/16	7/8	0.0012	0.0000	0.0013	0.0025	0.0013	0.0037
15/16	1 1/16	1	0.0013	0.0000	0.0014	0.0027	0.0014	0.0040
1 1/16	1 3/16	1 1/8	0.0014	0.0000	0.0015	0.0029	0.0015	0.0043
1 3/16	1 5/16	1 1/4	0.0014	0.0000	0.0016	0.0030	0.0016	0.0044
1 5/16	1 7/16	1 3/8	0.0015	0.0000	0.0018	0.0033	0.0018	0.0048
1 7/16	1 9/16	1 1/2	0.0016	0.0000	0.0020	0.0036	0.0020	0.0052
1 9/16	2 1/16	2	0.0016	0.0000	0.0022	0.0038	0.0022	0.0054
2 1/16	2 3/16	2 1/4	0.0017	0.0000	0.0024	0.0041	0.0024	0.0058
2 3/16	2 5/16	2 1/2	0.0018	0.0000	0.0026	0.0044	0.0026	0.0062
2 5/16	3 1/16	3	0.0019	0.0000	0.0029	0.0048	0.0029	0.0067
3 1/16	3 3/16	3 1/2	0.0020	0.0000	0.0032	0.0052	0.0032	0.0072
3 3/16	4 1/16	4	0.0021	0.0000	0.0035	0.0056	0.0035	0.0077
4 1/16	4 3/16	4 1/2	0.0021	0.0000	0.0038	0.0059	0.0038	0.0080
4 3/16	5 1/2	5	0.0022	0.0000	0.0041	0.0063	0.0041	0.0085
5 1/2	6 1/2	6	0.0024	0.0000	0.0046	0.0070	0.0046	0.0094
6 1/2	7 1/2	7	0.0025	0.0000	0.0051	0.0076	0.0051	0.0101
7 1/2	8 1/2	8	0.0026	0.0000	0.0056	0.0082	0.0056	0.0108

* (+) denotes clearance or amount of looseness.
NOTE: All dimensions in inches.

"tanking fit" and it is practically metal-to-metal. Assembly is usually selective and not interchangeable.

Tight Fit—Slight Negative Allowance (Class 6). Light pressure required to assemble, and the fits are more or less permanently set. They are used for the fixed end of studs for gears, pulleys, rocker arms, etc., drive fits in thin sections, or extremely long fits in other sections. Used in automotive, ordnance, and general machine manufacturing. Also used for shrink fits on very light sections.

Medium Force Fit—Negative Allowance (Class 7). Considerable pressure required and the fits are considered permanently assembled. Used in fastening locomotive wheels, car wheels, armatures of dynamos and motors, and crank disks to their axles or shafts. Also used for shrink fits on medium sections or long fits.

Heavy Force and Shrink Fit—Considerable Negative Allowance (Class 8). Used for fits where metal will stand great stress and where a heavy force fit is impractical. Such as locomotive wheel tires, heavy crank disks of large engines, etc.

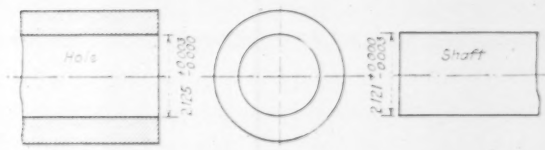

FIG. 1 EXAMPLE OF LOOSE FIT (CLASS 1)

	Hole	Shaft	
Tightest Fit	2.125	2.121	0.004 Allowance
Loosest Fit	2.128	2.118	0.010 Allowance + Tolerances

FORMULAS

When d = mean diameter,

Hole Tolerance = $0.0025 \sqrt[3]{d}$
Shaft Tolerance = $0.0025 \sqrt[3]{d}$
Allowance = $0.0025 \sqrt[3]{d^2}$

FIG. 2 EXAMPLE OF FREE FIT (CLASS 2)

	Hole	Shaft	
Tightest Fit	1.2500	1.2484	0.0016 Allowance
Loosest Fit	1.2514	1.2470	0.0044 Allowance + Tolerances

FORMULAS

When d = mean diameter,

Hole Tolerance = $0.0013 \sqrt[3]{d}$
Shaft Tolerance = $0.0013 \sqrt[3]{d}$
Allowance = $0.0014 \sqrt[3]{d^2}$

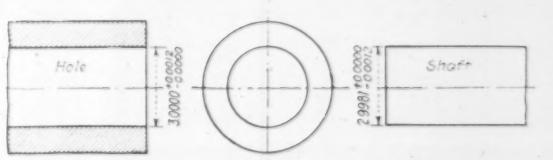

FIG. 3 EXAMPLE OF MEDIUM FIT (CLASS 3)

	Hole	Shaft	
Tightest Fit	3.0000	2.9981	0.0019 Allowance
Loosest Fit	3.0012	2.9969	0.0043 Allowance + Tolerances

FORMULAS

When d = mean diameter,

Hole Tolerance = $0.0008 \sqrt[3]{d}$
Shaft Tolerance = $0.0008 \sqrt[3]{d}$
Allowance = $0.0009 \sqrt[3]{d^2}$

TABLE 3 MEDIUM FIT (CLASS 3)

Diameter			Limits				Tightest Fit	Loosest Fit
From	Up to and Incl.	Mean	Hole		Shaft		Allowance	Allowance + Tolerances
			+	−	−	−	+*	+*
0	3/16	1/8	0.0004	0.0000	0.0002	0.0006	0.0002	0.0010
3/16	5/16	1/4	0.0005	0.0000	0.0004	0.0009	0.0004	0.0014
5/16	7/16	3/8	0.0006	0.0000	0.0005	0.0011	0.0005	0.0017
7/16	9/16	1/2	0.0006	0.0000	0.0006	0.0012	0.0006	0.0018
9/16	11/16	5/8	0.0007	0.0000	0.0007	0.0014	0.0007	0.0021
11/16	13/16	3/4	0.0007	0.0000	0.0007	0.0014	0.0007	0.0021
13/16	15/16	7/8	0.0008	0.0000	0.0008	0.0016	0.0008	0.0024
15/16	1 1/16	1	0.0008	0.0000	0.0009	0.0017	0.0009	0.0025
1 1/16	1 3/16	1 1/8	0.0008	0.0000	0.0010	0.0018	0.0010	0.0026
1 3/16	1 3/8	1 1/4	0.0009	0.0000	0.0010	0.0019	0.0010	0.0028
1 3/8	1 5/8	1 1/2	0.0009	0.0000	0.0012	0.0021	0.0012	0.0030
1 5/8	1 7/8	1 3/4	0.0010	0.0000	0.0013	0.0023	0.0013	0.0033
1 7/8	2 1/8	2	0.0010	0.0000	0.0014	0.0024	0.0014	0.0034
2 1/8	2 3/8	2 1/4	0.0010	0.0000	0.0015	0.0025	0.0015	0.0035
2 3/8	2 3/4	2 1/2	0.0011	0.0000	0.0017	0.0028	0.0017	0.0039
2 3/4	3 1/4	3	0.0012	0.0000	0.0019	0.0031	0.0019	0.0043
3 1/4	3 3/4	3 1/2	0.0012	0.0000	0.0021	0.0033	0.0021	0.0045
3 3/4	4 1/4	4	0.0013	0.0000	0.0023	0.0036	0.0023	0.0049
4 1/4	4 3/4	4 1/2	0.0013	0.0000	0.0025	0.0038	0.0025	0.0051
4 3/4	5 1/2	5	0.0014	0.0000	0.0026	0.0040	0.0026	0.0054
5 1/2	6 1/2	6	0.0015	0.0000	0.0030	0.0045	0.0030	0.0060
6 1/2	7 1/2	7	0.0015	0.0000	0.0033	0.0048	0.0033	0.0063
7 1/2	8 1/2	8	0.0016	0.0000	0.0036	0.0052	0.0036	0.0068

*(+) denotes clearance or amount of looseness.
NOTE: All dimensions in inches.

EXPLANATORY NOTES

In the table reproduced below many of the terms in common use in the shops of the country are given with the equivalent term which this Committee's report recommends:

Greatest Tightness Least Looseness Tightest Fit Neutral Zone Maximum Metal	Are all common terms which are the same as—	ALLOWANCE
Least Tightness Greatest Looseness Loosest Fit Minimum Metal	Are all common terms which are the same as—	ALLOWANCE PLUS TOLERANCES
Difference between largest and smallest permissible size of either members. Variation in the size allowed	Now called—	TOLERANCE

The basis for the following recommended allowances and tolerances is classification of fits, quite commonly known to the manufacturing public. Interference between mating parts takes place at the exact basic value of the dimension; hence an accepted pair of mating standard gages become the "go" gages for mating parts which will prevent interference at the basic value of the dimension.

On account of the lack of a uniform and acceptable method of measuring the fitting surfaces of external members of a pair of mating parts, it is recommended that plugs, blocks, disks, and rods govern the checking of external members for the reason that usually the same measuring device will check for accuracy both the internal member and the gage for the external member, thus avoiding an interference when both members appear to have the same dimension.

To illustrate: If a 2-in. hole be measured with an inside micrometer and a shaft be measured with an outside micrometer, and both measure exactly 2 in., there is no assurance they will go together; but, unless there was a definite understanding in a contract, the pieces might be ruled acceptable by law. If, however, the 2-in. hole would receive a plug gage which measured exactly 2 in. by a measuring machine, it would also receive an accurately finished shaft of the same size when measured by the same machine.

It is well known that a correct pair of plug and ring gages 2 in. in diameter will each check parts that will go together. It is also well known that the character of fit depends on the rotundity, parallelism, size, and in some cases, contour of the mating parts, and that for cylindrical fits in mating parts, plug and ring gages are the only sure means of determining whether or not parts will go together. If either member of a pair of mating parts is three- or five-cornered, a snap gage or micrometer will not insure their going together.

In the following allowances and tolerances, the best practice available was considered, and where differences occurred a compromise was attempted. The tolerances on holes apply only to reamed holes, or holes having a finish equivalent to reaming. From the standpoint of satisfactory performance, the tightest and loosest fits permissible are the all-important considerations. From a manufacturing standpoint, tolerances are the important factors. Hence both the tightest and loosest fit permissible must combine the tolerances and allowance, and therefore both allowance and tolerance must be considered for all-around satisfactory conditions.

It is not deemed feasible at the present writing to lay down allowances and tolerances which will apply to all work. Many so-called standard fits are made in the industries which are not interchangeable, and an attempt to make them so would be prohibitive in cost. They do, however, require to be made on a production basis, and it is believed that the tables here given will be found to contain allowances and tolerances which are suitable for most work, even if some selection or individual fitting of parts is desired.

In choosing the class of fit for manufacture, the engineer should keep in mind that cost usually increases proportionately to the accuracy required, and no finer class of fit should be chosen than the functional requirements actually demand. It is axiomatic that the closer the fit the smaller the manufacturing tolerance, and usually the greater the cost. The length of engagement of the fit also plays an important part in the selection of the class of fit for a piece of work. It is obvious that a long engagement will tolerate more looseness than a short one, and due regard should be paid to this feature.

Proposed Standard Sizes of Wrench-Head Bolts and Nuts

SUB-COMMITTEE No. 2 of the Sectional Committee on Bolt, Nut, and Rivet Proportions has completed its preliminary investigations and is now sending out its tentative proposals in the form of an eight-page 9 by 12 in. pamphlet. This tentative report contains seven tables and four charts which compare present practice in the United States and Europe with the new proposals.

The tables of proposed standard sizes cover:

a Rough square and hexagonal bolt heads and nuts
b Finished square and hexagonal bolt heads and nuts
c Finished light nuts
d Finished hexagonal and square machine-screw nuts
e Finished hexagonal and square cap screws
f Wrench openings.

These proposed standard sizes are intended for the use of all industries and the consequent replacement of the various existing standards now in use in these industries. In these early stages of its activity the Sub-Committee has worked in coöperation with the National Screw Thread Commission. The tables of sizes proposed have been tentatively considered and favorably received by that Commission. Some limited publicity has been given to the work of the Sub-Committee on Wrench-Head Bolts and Nuts, but it has seemed wise to the Sub-Committee that before final report is made to the Sectional Committee, it should have more universal criticism of the proposed standard sizes.

It has seemed wise to reduce the number of wrenches required through simplification of outside dimensions of bolts and nuts. This policy also tends to reduce the number of sizes of raw material which the bolt and nut manufacturer must carry in stock. In order to obtain this result, it has been necessary to depart from sizes calculated by formulas by 1/32 in. for the smaller sizes of bolt heads and nuts and by larger amounts for the larger sizes. It will be noted that similar practice has been followed in the S.A.E. standard and in many foreign standards. The factor of safety in both heads and nuts appears sufficient to permit this.

It is hoped that criticism of the proposed dimensions with detailed reasons therefor will be made by both manufacturers and consumers, in order that the dimensions finally recommended as standard may meet as far as practicable with the approval of all.

Copies of this pamphlet may be obtained by addressing C. B. LePage, Assistant Secretary, The American Society of Mechanical Engineers, 29 West 39th Street, New York. Criticisms and comments should be sent to the Chairman at the same address.

SURVEY OF ENGINEERING PROGRESS

A Review of Attainment in Mechanical Engineering and Related Fields

A New Diagram for Water Vapor-Air Mixtures

By PROF. A. MOLLIER[1]

AT THE BASIS of all calculations dealing with water vapor-air mixtures (humid air) lies the Dalton law. It applies fully only to mixtures of perfect gases, i.e., gases which obey solely the equation of state $pv = RT$, and whose energy and heat content depend exclusively on temperature. Air obeys the laws of perfect gases, but water vapor deviates from them to a noticeable extent, the more so the higher its pressure and the lower its temperature. Because of this when we have to deal in engineering with water vapor-air mixtures wherein the partial pressure of the water vapor is of the order of several atmospheres, the precise calculation becomes difficult, as instead of the Dalton law and simple expressions for the energy and heat content of the mixture, it is necessary to deal with complicated and as yet comparatively little-known laws. As a matter of fact, however, in the vast majority of cases arising in practical engineering work, the partial pressure of the water vapor does not exceed 1 atmos. and at such a low pressure water vapor may be treated as a perfect gas in a manner that will not affect the precision of the results to any very great extent. This, of course, materially simplifies all calculations.

Quite frequently a somewhat different method is used. While the Dalton law is still used as a foundation, the volume and heat content of water vapor are computed not in accordance with the gas equations but (when the steam is in a state of saturation) are taken from steam tables. Since the proper handling of problems involving unsaturated (superheated) steam leads to excessively involved computations, however, it is customary to revert to the gas laws by assuming that the density of the steam at given temperature is proportional to the partial pressure and that the heat content is independent of the pressure. This procedure is, however, time consuming, lacking in proper checks, and full of internal contradictions. Furthermore, should water vapor-air mixtures become widely employed in engineering with such high partial pressures of water vapor that simple gas laws would no longer serve, it would become necessary to investigate critically the entire problem of the computation of their properties.

As a rule gases are miscible in all proportions. We express the composition of such mixtures by volumes, and the relation between the volumes is equal to the ratio of the partial pressure to the total pressure. As regards water vapor, however, it can be mixed with air only to a limited extent, because its partial pressure cannot be greater than the saturation pressure h corresponding to the given temperature. (The author gives all pressures in millimeters of mercury.) The partial pressure of water vapor h_D may, however, be smaller than the saturation pressure, and it is usual and convenient to express the partial pressure as a fraction of the saturation pressure h', that is, $h_D = \varphi h'$. When written this way the expression indicates how far the air is still from saturation by water vapor, this being due to the fact that according to the gas law φ expresses also the ratio of the vapor content in a given volume to the maximum quantity of vapor which may be contained therein. φ is therefore called the relative humidity or degree of saturation of the air.

Assume that a room of V cubic meters capacity contains a water vapor-air mixture of pressure h and absolute temperature $T = 273 + t$ deg. cent. We can apply the equation of state of gases to the total weight of the mixture and its two constituent parts. For air,

$$(h - \varphi h')V = 2.153\, G_L T \ldots\ldots\ldots\ldots\ldots\ldots [1]$$

where $h - \varphi h' = h_L$, which is the partial pressure in millimeters of mercury, while G_L is the weight of air in kilograms. For steam,

$$\varphi h' V = 3.46\, G_D T \ldots\ldots\ldots\ldots\ldots\ldots [2]$$

For the mixture,

$$hV = GRT; \quad R = \frac{2.153}{1 - 0.378\,\frac{\varphi h'}{h}} \ldots\ldots\ldots\ldots [3]$$

and

$$G = G_L + G_D = \frac{0.465\, h - 0.176\, \varphi h'}{T}\, V \ldots\ldots [4]$$

In one cubic meter of moist air there are therefore $0.289\,\frac{\varphi h'}{T}$ kg. or $289\,\frac{\varphi h'}{T}$ grams of water vapor.

During the changes of state of water vapor-air mixtures the amount of air usually remains unchanged while the amount of water vapor present is increased through condensation or decreased through evaporation. Because of this it is customary to consider mixtures of this character as containing 1 kg. of air and variable amounts of water vapor. The amount of water vapor in kilograms per kilogram of air may be denoted by x, where

$$x = \frac{G_D}{G_L} = \frac{2.153}{3.460} \times \frac{\varphi h'}{h - \varphi h'} = 0.622\,\frac{\varphi h'}{h - \varphi h'} \ldots\ldots [5]$$

and the total weight of the mixture is $G = 1 + x$. The volume of such a mixture is

$$V = \frac{2.153\, T}{h - \varphi h'} \ldots\ldots\ldots\ldots\ldots\ldots [6]$$

and the partial volume occupied by the water vapor is

$$r_D = \frac{\varphi h'}{h} = \frac{x}{0.622 + x} \ldots\ldots\ldots\ldots\ldots [7]$$

In technical calculations regarding water vapor-air mixtures one needs above all, in addition to a knowledge of the relations between pressures, temperatures and volume, a knowledge of their heat content i. In the case of perfect gases the heat content (assuming that within the narrow range of temperature dealt with here the specific heat c_p is constant) is

$$i = c_p t + C$$

where the constant C is arbitrary. For air it is zero, which means that the heat content of the mixture is calculated on the basis of air at 0 deg. cent. so that $c_p = 0.24$.

For water vapor within the corresponding range of temperature $c_p = 0.46$. It is, however, of advantage to refer in calculating the heat content of water vapor, not to vapor at 0 deg. cent. but to water at that temperature; the constant heat of evaporation at 0 deg. cent. is then 595 kg. cal., and

$$i_L = 0.24\, t \text{ and } i_D = 595 + 0.46\, t$$

and for the heat content of a mixture containing 1 kg. of air

$$i = i_L + x i_D = 0.24\, t + x\,(595 + 0.46\, t) \ldots\ldots [8]$$

$$i = 0.24\, t + 0.622\,\frac{\varphi h'}{h - \varphi h'}\,(595 + 0.46\, t) \ldots\ldots [8a]$$

[1] Dresden, Germany.

$$i = 0.24\,t + \frac{\varphi h'}{h - \varphi h'}\,(370 + 0.286\,t) \ldots\ldots\ldots [8b]$$

It is important to note that these formulas give also the heat content of 1 kg. of air plus x kg. of water vapor plus any desired amount of water at 0 deg. cent.

In practice one has most frequently to deal with variations of state which occur at constant total pressure, this pressure being generally the same as the external pressure. In such cases the solution of practical problems may be materially simplified by graphic methods. As the state of a water vapor-air mixture containing 1 kg. of air and a given constant total pressure h is determined by two out of four variables, t, i, x, and φ, it becomes possible to select two of these families of curves for constant values, treating the other two as variables. According to the procedure suggested by O. H.

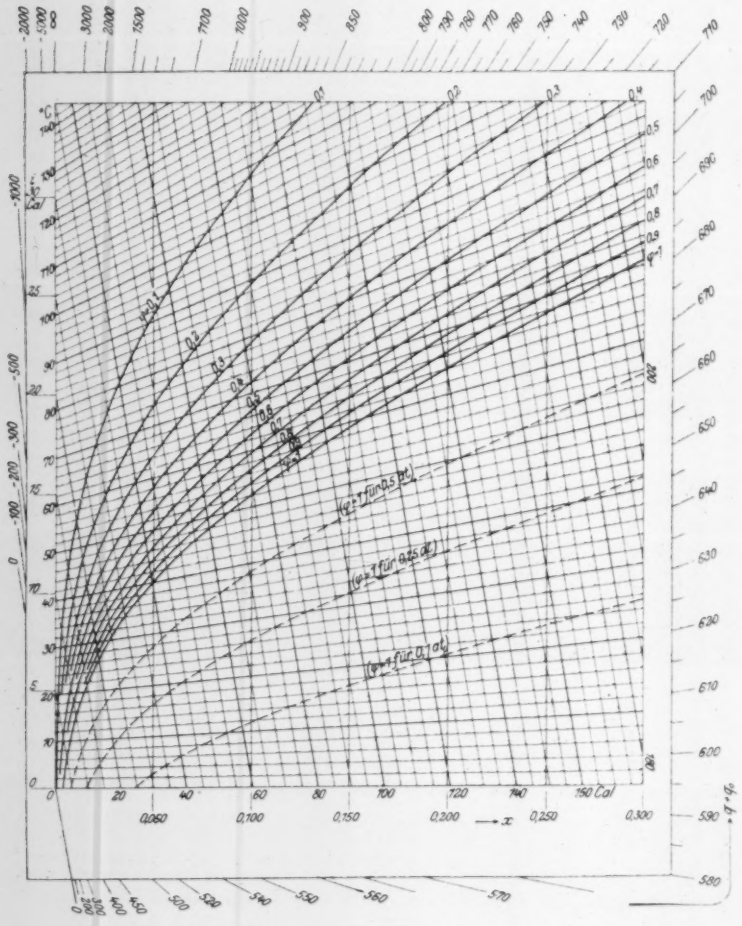

FIG. 1 MOLLIER DIAGRAM FOR WATER VAPOR-AIR MIXTURES

Mueller, t and i are generally chosen for coördinates of the diagram, and curves are plotted for equal values of x and of φ, the former being straight lines.

The author suggests another procedure in which i and x are used as coördinates (Fig. 1). This gives a diagram which affords solutions of all the problems solvable by the i-t diagram, as well as of those that cannot be handled by the latter. For the best results the author recommends the use of coördinates at acute angles to each other. Favorable conditions are secured by making the 0-deg. line passing through the origin horizontal. (The isotherms are straight lines in accordance with Equation [8].) The diagram is then used in the following manner. First, Equation [8] is written in the form

$$i = (0.24 + 0.46\,x)\,t + 595\,x \ldots\ldots\ldots\ldots [8c]$$

where the first member i' represents the heat constant of the mixture referred to air and water vapor at 0 deg., and the second member is the heat of evaporation of the vapor x at 0 deg. Next x and i' are selected as abscissas and ordinates in a rectangular system in which $i' = (0.24 + 0.46\,x)\,t$.

The isotherms are straight lines cutting off equal sections on the ordinates for equal differences of temperature. The line $t = 0$ coincides with the axis of abscissas. The lines for constant degrees of saturation can be easily plotted in accordance with Equation [5]. Both groups of lines remain unaffected in passing to the acute-angle system of coördinates with i and x as coördinates, which is accomplished by plotting $595\,x$ from the available axis of abscissas downward. The straight line thus obtained is the ultimate axis of abscissas and indicates the direction of lines of constant heat content.

The diagram of Fig. 1 is plotted for a pressure of 735.5 mm. = 1 atmos., but may be used without introducing material errors for other air pressures in close proximity thereto. The isotherms are not affected by the fact that a different total pressure is used as the basis of the diagram. The behavior of curves of equal degrees of saturation is given in this case by Equation [5] which can be written in the following form:

$$x = 0.622\,\frac{\left(\frac{735.5}{h}\,\varphi\right)h'}{735.5 - \left(\frac{735.5}{h}\,\varphi\right)h'} = 0.622\,\frac{\left(\frac{\varphi}{p}\right)h'}{735.5 - \left(\frac{\varphi}{p}\right)h'}$$

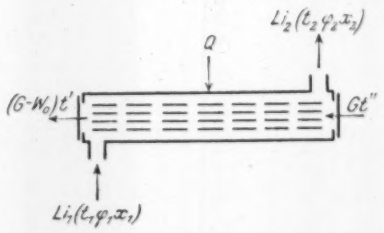

FIG. 2 DIAGRAMMATIC SKETCH OF A CONTINUOUS-PROCESS DRIER

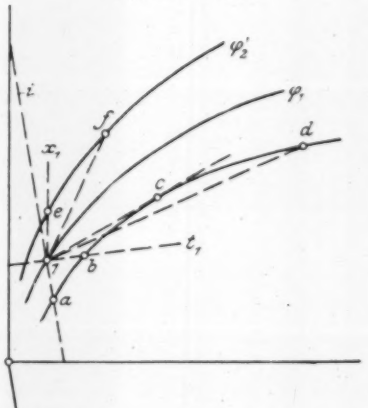

FIG. 3 CURVES USED IN COMPUTING THE HEAT BALANCE OF THE DRIER SHOWN IN FIG. 2

where h is in millimeters and p in atmospheres expresses the new total pressure. It would appear from this that the family of φ-lines is not affected either, though the value of φ appertaining to any one of them changes with pressure. A line which represents the value of φ at a pressure of 735.5 mm. or 1 atmos. corresponds at h mm. or p atmos. to the degree of saturation $\frac{h}{735.5}\,\varphi$ or to $p\varphi$. In the diagram of Fig. 1 are plotted a few lines of complete saturation for other pressures.

The diagram may also be used for changes of state where the vapor content of the air remains constant. In this case x is constant and the change of state is indicated by drawing a parallel to the axis of the ordinates. For this purpose the new diagram has the advantage as compared with the i-t diagram that the heat which has to be either supplied or abstracted as the case may be, is indicated simply by the distance between the initial and end points of the change of state. To find the dewpoint, all that is necessary is to move parallel to the axis of the ordinates up to the point of intersection with the curve $\varphi = 1$ and read off the corresponding temperature.

As a rule, in changes of state of water vapor-air mixtures it is the vapor content x of the air that varies. In such cases one has to consider not only the gaseous constituents but also a certain amount of liquid water which either arises through condensation or disappears through evaporation; it is expressed in a change of state from 1 to 2 of 1 kg. of air by $x_2 - x_1$. The variation of the heat content F, $i_2 - i_1$, given by the diagram or by Equation [8], represents in this case not the heat which has to be supplied or abstracted during the change of state, but an amount smaller or greater than that by $(x_2 - x_1)\, t_0$, where t_0 is the initial or final temperature of the evaporated or condensed water. This is possible, because as has been stated above the present diagram and likewise Equation [8] give the heat content of a water vapor-air mixture with a content of 1 kg. of air plus any amount of liquid water at 0 deg. cent. Hence

$$Q_{1,2} = i_2 - i_1 - (x_2 - x_1)\, t_0$$

APPLICATION OF THE DIAGRAM

The author gives three examples of the application of his diagram to the solution of practical problems: namely, the establishment of the heat balance of a drier, drying with preheated air, and the establishment of the heat balance of a return cooling plant. Because of lack of space only the first of the three can be reported here.

Fig. 2 shows a continuous-process drier. G kg. of wet material are delivered to the drier per hour at the temperature t'' and leave it at the temperature t' weighing $G - W_0$ kg., where W_0 is the weight of the water abstracted from the goods in the drier in the unit of time. The specific heat of the dried goods in the final state is c. The physical characteristics of the handling devices are taken care of by the values of Gc. The drier receives per hr. L kg. of air having the temperature t_1, vapor content x_1, degree of saturation φ_1, and heat content i_1; in the same period the same amount of air (at t_2, φ_2, x_2, and i_2) leaves from the drier. Furthermore the drier receives per hr. an amount of heat equal to Q kg-cal., it being immaterial how this heat is introduced, and loses through radiation and convection Q_V kg-cal. per hr. The heat balance of the drier is therefore

$$Q = L\,(i_2 - i_1) + (G - W_0)\, c\,(t' - t'') - W_0 t'' + Q_V \ldots [9]$$

This may be expressed in terms of kilograms of water extracted from the goods; if Q/W_0 be replaced by q and L/W_0 by l, then

$$q = l\,(i_2 - i_1) - \left[t'' - \left(\frac{G}{W_0} - 1\right) c\,(t' - t'') - \frac{Q_V}{W_0}\right] \quad [9a]$$

The bracketed portion of the equation may be designated by q_0; and its value as compared with $l\,(i_2 - i_1)$ is in many cases so small that it may be neglected entirely. It is only where G/W_0 is very large, as for example, in the drying of vegetables, that q_0 may attain considerable negative values.

The water W_0 abstracted from the goods leaves the drier in the form of vapor mixed with the air and raises the initial vapor content x_1 of the latter to x_2. Hence

$$W_0 = L\,(x_2 - x_1) \text{ or } l\,(x_2 - x_1) = 1 \ldots\ldots\ldots [10]$$

and by combining Equations [9a] and [10],

$$q + q_0 = \frac{i_2 - i_1}{x_2 - x_1} \ldots\ldots\ldots\ldots\ldots [11]$$

For purposes of numerical calculation values from Equations [8] and [8a] may be introduced into Equation [11], giving

$$q + q_0 = 595 + (0.24 + 0.46\, x_1)\,\frac{t_2 - t_1}{x_2 - x_1} + 0.46\, t_2 \ldots [11a]$$

$$q + q_0 = 595 + \frac{0.386 + 0.46\,\dfrac{\varphi_1 h'_1}{h - \varphi_1 h'_1}}{\dfrac{\varphi_2 h_2}{h - \varphi_2 h'_1} - \dfrac{\varphi_1 h'_1}{h - \varphi_1 h'_1}}\,(t_2 - t_1) + 0.46 t_2 \ldots [11b]$$

The last equation gives the heat consumption of a drier as a function of temperatures and degrees of saturation of the incoming and outgoing air.

The consideration of the relations affecting heat consumption and their calculation is greatly facilitated by the use of the i-x diagram. One may start from the simple Equation [11] which shows that the value of $q + q_0$ is given simply by the angle of inclination of the line connecting the points 1 and 2, which corresponds to the state of the air at the entrance to and exit from the drier, and, in turn, is given by the temperatures t_1, t_2 and degrees of saturation φ_1, φ_2. In order to facilitate still further the determination of q there is given on the edge of the diagram a scale for the values of i/x. All that is necessary, therefore, is to draw through the origin a line parallel to the line connecting 1 and 2, and this line will cut off on the scale on the edge of the diagram the value $q + q_0$. Since q is always of the order of magnitude of the heat of vaporization, q_0 may be often neglected entirely.

The specific air consumption, which, according to Equation [10], is $l = \dfrac{1}{x_2 - x_1}$, is given by the reciprocal value of the horizontal distance between points 1 and 2. This distance itself represents the amount of water which may be dried out by the flow of 1 kg. of air.

Drying is possible when $x_2 > x_1$. If no heat is supplied, $q = 0$, and we have the case of natural drying. Then must $\varphi_1 < \varphi_2$, and for $q_0 = 0$, $i_1 = i_2$ and $t_2 < t_1$, and the consumption of air is very large. This case is represented in Fig. 3 by the distance 1-a.

If we assume that the initial state of the air and φ_2 are constant and that t_2 is gradually rising, we shall find that the heat consumption is increasing but the air consumption falls off. For $t_2 = t_1$, or 1-b, it will be found that $q + q_0 = 595 + 0.46\, t_1$. In other words, we are dealing here with the heat content of steam at the temperature t_1. However, q may increase only up to a certain maximum value, which is reached when the straight line 1-c drawn through the origin intersects with the φ_2-curve. With a further increase of t_2, $q - q_0$ falls off again (line 1-d) until for $l_1 = 0$ we have $x_2 = \infty$, which in the case of pure evaporation gives $q + q_0 = 595 + 0.46 t_2 = 640$. If $\varphi_1 > \varphi_2$ it begins to become possible to produce drying, but only at a temperature of $t_2 > t_1$ (line 1-e, Fig. 3), when $l = \infty$ and $q = \infty$. As the temperature t_2 rises, q falls off gradually (line 1-f) and the former maximum value disappears. (*Zeitschrift des Vereines Deutscher Ingenieure*, vol. 67, no. 36, Sept. 8, 1923, pp. 869–872, 5 figs., *ep.A*)

Short Abstracts of the Month

ENGINEERING MATERIALS

RECORD OF INTERIOR TEMPERATURES IN CONCRETE. Data of an investigation which is being carried on by Mr. J. B. Henley on a large reinforced-concrete arch being built by the Big Four Railroad over the Miami river at Sidney, Ohio.

Soon after the forms were removed from one of the piers, cracks were noted at a number of places on the face of the pier. After considering all the conditions, the conclusion was reached that the trouble was caused by a more rapid reduction of the temperature of the surface of the pier than of that part slightly below the surface. In other words, it was believed to be due to rapid surface radiation, which necessarily presupposed comparatively higher interior temperatures than were known to exist.

An investigation was therefore determined upon on a mass of freshly deposited concrete and proper arrangements were made to place several thermometers at various points in a block.

The data of these observations are presented in the original article in the form of temperature-record diagrams. In all cases it was found that there was the same rapid rise in temperature, the same curve of initial fall, the same relative lower temperature, and that substantially a period of two months elapsed before the effect of external temperatures was observed. (*Railway Review*, vol. 73, no. 14, Oct. 6, 1923, pp. 481–484, 4 figs., *e*)

THE SIGNIFICANCE OF TOOL TEMPERATURES AS A FUNCTION OF THE CUTTING RESISTANCE OF METALS, H. A. Schwartz[1] and W. W. Flagle.[2] The authors describe an instrument for recording the

[1] Mem. A.S.M.E.

[2] Engineer of Tests, Research Dept., The National Malleable Castings Co., Cleveland, Ohio.

changes of temperature of a drill or other cutting tool in action. It is believed that the life of a given tool is a function of its working temperature, and hence that the temperatures reached under given cutting conditions in varying materials are an indication of their machinability or cutting hardness.

Data covering typical ferrous alloys of commerce are given. Some relations between energy per cubic inch of metal removed, temperature, and rate of removal of metal are shown which suggest the utility of the pyrometer in lieu of a tool dynamometer. The further study of the behavior of tool steels at various temperatures is suggested. (Paper presented before the *American Society for Testing Materials* at Annual Meeting, Atlantic City, N. J., June, 1923. Abstracted from preprint, 14 pp., 7 figs., *e*)

RESISTANCE OF MANGANESE BRONZE, DURALUMIN, AND ELECTRON METAL TO ALTERNATING STRESSES, R. R. Moore.[1] This paper gives the results of an investigation made by the Engineering Division of the Air Service at McCook Field, Dayton, Ohio, to determine the endurance limit of duralumin bar stock as rolled, annealed, and tempered. Similar investigations on manganese bronze and electron metal are included. Tests were made on rotating-beam machines of the same type as used in the fatigue investigation at the University of Illinois and on the same type of specimen.

In addition to having established an endurance limit for duralumin, some other important points covered are:

1 Evidence that the endurance limit of non-ferrous metals cannot be determined by applying 10,000,000 repetitions of stresses, as is the case with most steels. This is borne out by tests in which failures have been obtained at 30, 50, 80, and even 100 million repetitions of stress.

2 Results of long-time tests, that is, 200 to 400 million repetitions of stress

3 Polishing of specimens at the critical section

4 Difficulties encountered in adapting this type of machine and specimen (which were primarily designed for steel) to light aluminum alloys. (Paper presented before the *American Society for Testing Materials* at Annual Meeting, Atlantic City, N. J., June, 1923. Abstracted from preprint, 17 pp., 8 figs., 2 tables, *e*)

FOUNDRY (See Railroad Engineering)

FUELS AND FIRING (See also Testing and Measurements, Motor-Car Engineering)

GEISSINGER AUTOMATIC TEMPERATURE CONTROL FOR OIL-FIRED FURNACES. Description of a system devised by H. G. Geissinger, of Detroit, Mich. The illustration in the article shows a unit built into pipe lines which feed a Rockwell furnace.

In this control system electricity is used as a motive force because safety against overheating is assured if the power supply fails. The principal part of the equipment consists of a center casting which houses a single two-pole strong magnet. This is energized as long as the indication of the pyrometer is below normal. The magnetic flux attracts the armatures which are fastened to the valves and holds them wide open. As soon as the indication of the pyrometer exceeds the normal value, the current flowing through the magnet coil is interrupted and both fuel and air valves are returned to the almost closed position by springs. The control of the relay which switches the power on and off the solonoid can be affected by any depresser-bar pyrometer.

If one of the two valves moves harder than the other one, no harm is done, because the freely moving valve is attracted first and by its attachment to the magnet greatly increases the magnetic flux, thereby vastly augmenting its strength. The sticking valve is moved without fail by this strong force.

Since in this system both fuel and air are controlled by valves, it may under certain conditions be used to control not only furnace temperature but furnace atmosphere. The original article shows the piping diagram of this system for fuel-fired furnaces and the wiring diagram for the fuel control system. (*Fuels and Furnaces*, vol. 1, no. 6, Oct., 1923, pp. 437–439, 4 figs., *d*)

[1] Chief, Physical Testing Branch, Engineering Div., U. S. Air Service, McCook Field, Dayton, Ohio.

HYDRAULIC ENGINEERING

Weir Flow

WEIR FLOW, Dempster Smith and Dr. Wm. J. Walker.[1] In a previous paper (Proc. Inst. M.E., 1923, p. 23) the authors investigated orifice flow with the object of obtaining a formula based on physical considerations. In that paper it was found that the chief factor governing variations in the coefficient of discharge C_d is adhesion and not friction. With low heads and small orifice dimensions adhesion plays a very effective part, and it is perhaps the neglect of this factor which would explain certain difficulties occurring in hydraulic experimental work at low velocities of flow and with small-dimension channels.

In setting out upon the experimental work on weir flow the object held in view was to render by the measurement of as many variables as necessary an analysis which would result in the derivation of a sufficiently general formula capable of application to limited cases. Because of lack of space only the main results can be given here.

Rectangular Weirs. As regards the coefficient of contraction C_c, it would appear that for each width of weir the tendency is for constancy of contraction for all heads. With this in view it was decided to consider C_d (coefficient of discharge) in Formula [1]

$$Q = \frac{2}{3} C_d b \sqrt{2g} \left(h^{\frac{3}{2}} - h_1^{\frac{3}{2}} \right) \quad [1]$$

as constant for each width of weir.

The relation between h and h_1 (Fig. 1) was determined next and found to be such that it could be represented by $h_1 = kh^n$, where

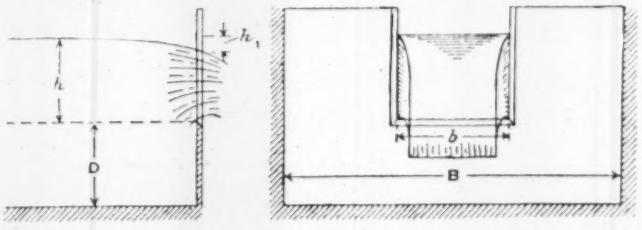

FIG. 1 RECTANGULAR WEIR

n depended upon the ratios b/B and $h/(h + D)$ (Fig. 1). Eventually k was chosen as 0.15 and n as

$$\sqrt{\frac{b}{B}} + \sqrt{\frac{h}{h + D}}$$

The relation between C_c and width of weir was expressed by the formula

$$C_c = \frac{1.08\,\pi}{\pi + 2\left(1 - \frac{b}{B}\right)}$$

which allows for the diversion of the stream lines due to the proximity of the walls of the approach channel. This was found to fit the results fairly closely.

The general formula [1] now becomes

$$Q_t = \frac{2}{3} C_c C_v b \sqrt{2g} \left(h^{\frac{3}{2}} - 0.15\, h^{\frac{3n}{2}} \right)$$

where C_c and n have the values indicated above and C_v is taken equal to 0.965. The necessity for the factor 1.08 in the formula for C_c is considered to be due to the fact that in weir flow a free surface exists which does not hold in jet flow, contraction consequently not being so complete in the former as in the latter type of flow. The formula, then, as finally adopted is

$$Q_t = \frac{2}{3} C_d b \sqrt{2g} \left(h^{\frac{3}{2}} - 0.15\, h^{\frac{3n}{2}} \right)$$

If measurements are made in inches this may be written as

$$Q_t = \frac{60.3\ b}{\pi + 2\left(1 - \frac{b}{B}\right)} \left(h^{\frac{3}{2}} - 0.15\, h^{\frac{3n}{2}} \right) \text{ cu. in. per sec.}$$

[1] College of Technology, Manchester, England.

If in feet,

$$Q_t + \frac{17.4\ b}{\pi + 2\left(1 - \frac{b}{B}\right)}\left(h^{\frac{3}{2}} - 0.15\ h^{\frac{3n}{2}}\right) \text{ cu. ft. per sec.}$$

A peculiar feature about this formula is that it indicates, for a given head, that the discharge is increased by narrowing the approach channel, but diminished by diminishing the depth D of the channel bed below the sill of the weir.

The authors derive similar formulas for the right-angled notch. (*Proceedings of the Institution of Mechanical Engineers*, no. 4, June, 1923, pp. 819–834, 8 figs., *tA*)

INTERNAL-COMBUSTION ENGINEERING (See Motor-Car Engineering)

MACHINE PARTS AND DESIGN

Falk-Bibby Flexible Couplings

FALK-BIBBY FLEXIBLE COUPLINGS. Description of a new coupling, Fig. 2, used for the transmission of power between shafts which may be either parallel or in angular misalignment. The coupling consists of two flanged steel disks (one keyed to each shaft), a tempered steel spring in segments, forming a continuous cylindrical grid, and a shell. On the outsides of the flanges are pitched cross-grooves in which the spring is placed. The spring is the flexible member and its shape, and that of the grooves, forms the characteristic feature of the coupling. The grooves in the disk widen inward toward each other, so that the spring fits closely in them only at their outer ends. This widening of the grooves is in

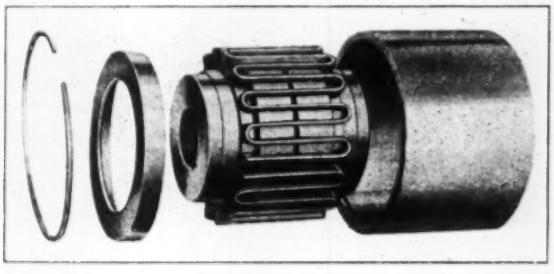

FIG. 2 FALK-BIBBY COUPLING

the form of an arc of definite radius and is produced by special machines used for the manufacture of these couplings. The radius of the arc bears a definite relationship to the thickness of the spring bars and is designed so that when each bar is bent around this radius the stress in the spring cannot exceed a fixed safe value. Under light and normal loads there is a long free span of spring between the points of support on the two flanges, which allows for considerable flexibility, but under heavy overloads the spring members become supported along the sides of the grooves, thereby automatically shortening without increasing the stress.

Under very extreme overloads the springs are supported at their inner ends and are then in shear and capable of resisting many times the load for which the coupling is designed.

The flexibility of the springs is always properly proportioned to the load. Under a light load each bar or element is flexed between points separated by the maximum distance. As the load increases the springs wrap themselves around the walls of the grooves, with their inwardly flaring construction, and the proper curving of these grooves makes it possible for the increasing load to shorten the effective span of each spring bar, thus causing it to offer greater resistance to bending without increase of stress. A high degree of torsional flexibility, with greater resistance to increased torque, is thereby produced.

All the working parts of the coupling are enclosed in a floating shell which provides space for the packing of lubricant. The shafts are aligned as easily as with flange couplings, and disconnection is accomplished expeditiously by simply releasing the shell and removing the springs around the periphery of the flanges. (Abstracted from a company publication, Bulletin No. 33, 6 pp., illustrated, *d*)

MACHINE SHOP (See also Engineering Materials)

Double Tables on Milling Machines

INCREASING PRODUCTION MILLING BY DOUBLING TABLES, Frank H. Mayoh, Mem. A.S.M.E. An article describing means of converting a regular vertical or horizontal milling machine, having one table, into a machine of increased capacity. To this end, as shown in Fig. 3, the machine is equipped with two traveling tables mounted on a special saddle, and regular knee construction with some modifications is used.

By means of this arrangement continuous milling can be accomplished, as an operator loads work on one table while the other table is passing under the milling cutter. He need not wait for one table to complete its cut before starting the next, but may start it as soon as he is ready or has the work in place, thus performing even more work than is performed on a continuous rotary-table machine, and with fewer fixtures and a greater range of work.

This necessitates two gangs of cutters on the arbor in the case of a horizontal machine, or in the case of a vertical machine two ver-

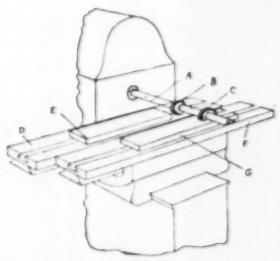

FIG. 3 KNEE TYPE OF MILLING MACHINE WITH TWO TABLES

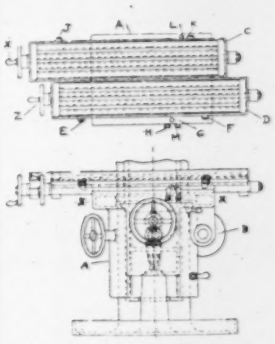

FIG. 4 ARRANGEMENT OF TWO TABLES FOR MILLING

tical spindles with cutters or a surface mill of a diameter which will cover work on both tables.

In Fig. 3 the milling spindle is indicated at A. This has two cutters mounted thereon, B and C. A table D, having work indicated as E, is fed under the cutter B, while at the same time a table F, having work G mounted thereon, is fed under the cutter C. Both of these tables are fed at once, intermittently, as fast as the cut can be completed and the operator can load the fixtures on the tables. It is not necessary to wait for both tables to be loaded, as they can be fed one before the other as illustrated.

Two tables somewhat narrower than those regularly employed can be fitted on a machine of normal size of either the light-weight, medium-weight, or heavy class.

Fig. 4 is a plan view and front elevation of a pair of tables mounted on the knee of a milling machine, showing the general arrangement and method of operation. In these views the knee of the machine is indicated at A, and a train of gears in a case at B drive the two tables C and D through intermediate gearing in the knee. Table stops E and F, in combination with a plunger L and lever M, control the feeding of table C.

The article describes and illustrates several set-ups that can be used with this arrangement, in particular a case of straddle milling and continuous milling. It shows also that this arrangement is adapted to rotary work and that the feed may be arranged to work in opposite directions. (*Canadian Machinery*, vol. 30, no. 13, Sept. 27, 1923, pp. 14–17 and 32, 13 figs., *dp*)

MACHINE TOOLS

A New Herringbone-Gear Planer

A NEW HERRINGBONE-GEAR PLANER, N. Leerberg. Description of a new design in which two tools cut simultaneously and move in a helical path, the work being held stationary during cutting to give stability.

In cutting gears with a pitch greater than 1 D.P. the usual methods are claimed to have drawbacks. The cutting surface of the tools becomes so great that it is difficult to obtain sufficient rigidity for

efficient operation. It is necessary to machine the teeth from the solid blank, requiring the removal of great quantities of metal, and also giving a metal not as close-grained as when the teeth are blocked out in casting. It is for such work on coarse pitches that the planing process is best adapted.

In the earlier herringbone-gear planers the gear blank was made to rotate as the tool advanced along the face of the gear, but the spring in the gear blank when the latter was much over 6 ft. in diameter made it impossible to make good time on such a machine. About seven years ago a machine was developed in which the gear blank was clamped rigidly while the tool passed along an approximate helical path. The machine described here is a further development of this.

The principle of the machine is as indicated diagrammatically in Fig. 5, and the motion is the resultant of the longitudinal motion

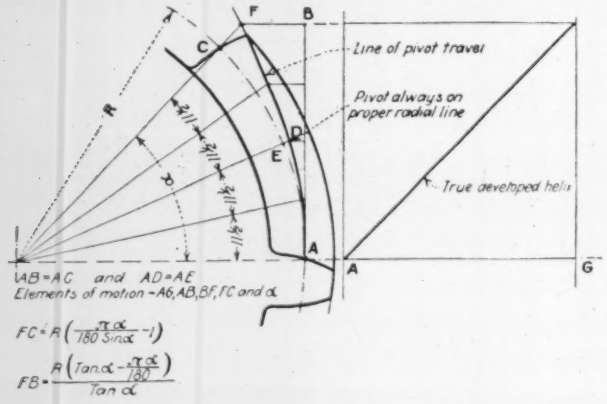

Fig. 5 Diagram Showing How Helical Motion of Cutting Tool in the Herringbone-Gear Planer is Obtained

AG, vertical motion AB, transverse motion BF, radial motion FC, and angular motion α. The primary motion is therefore the development of a helix in a vertical plane tangent to the pitch cylinder. But this development is constantly being folded into the cylindrical pitch blank as follows: The pivot point is moved transversely the distance BF until it falls on the proper radial line. The tool is then swung radially around a pivot following the line AF, and thereafter moved along the radial line until the cutting point falls at the pitch line. All these motions are simultaneous.

Mechanically these motions are produced in a machine shown in drawings in the original article. The machine consists mainly of two sole plates carrying the base plate on which are mounted two columns. These columns carry two vertical slides having pivots, and the planer rail is supported by these pivots as well as by worm drives.

The tool-head carriers slide simultaneously toward the center of the gear face during the cutting stroke. The drives and action of the specific parts are described and illustrated in the original article. (*American Machinist*, vol. 59, no. 15, Oct. 11, 1923, pp. 561–563, 3 figs., *d*)

Nibbling Machines. Description of two nibbling machines made by Andrew C. Campbell, Inc., Bridgeport, Conn.

The principle of operation of these machines is somewhat on the order of a combination slotting and punching action. In the first machine sheet stock of whatever material, including steel, brass, aluminum, bakelite, fiber, etc., may be quickly cut to any desired outline of regular or irregular contour through the use of lines scribed on the sheet, or the work may be guided by a templet superimposed on it, the amount of feed being governed by a stop which is a part of the cutting tool or punch.

The machines were shown at the Machine Tool Exhibition held recently at Yale University, where one of them was employed on roughing out Brown and Sharpe automatic screw-machine cams.

One of these machines produced a five-lobe cam from $^3/_8$-in. stock, ready for filing and hardening, in 1 min. 50 sec. It was also used in making stripper plates. The machine is adaptable for the production of a limited number of duplicate parts.

Rapid action, quick adjustment, ease of operation, simplicity of parts, and low upkeep of tools are features claimed for these machines. (*The Iron Age*, vol. 112, no. 15, Oct. 11, 1923, p. 964, 2 figs., *d*)

MEASURING APPARATUS (See Hydraulic Engineering)

MEASURING INSTRUMENTS (See Testing and Measurements)

MECHANICS

Stresses in Pipes, Prof. Gilbert Cook. The paper deals with the design of pipe lines in large hydroelectric installations working under high heads. For a given discharge and head at the power station, considerable economy in material can be effected by increasing the size and reducing the number of the pipes. In the plain welded pipe a limit of size is imposed by the maximum thickness which can be welded satisfactorily, and recourse has been had to a system of reinforcement by means of steel rings shrunk on at intervals. Interest arises as to the method by which the strength of these pipes may be estimated. The investigation dealt with by the author has several points of interest, among them the question as to the conditions under which a reinforced pipe can be made lighter than a plain pipe. Some unexpected conclusions have been reached regarding the relation between the spacing of the ring reinforcement and its effectiveness. The author has investigated the stresses in the case of a reinforced pipe in the pipe line of the Los Angeles power station. The internal diameter of the pipe is 80 in. and the thickness 0.63 in. The reinforcing rings are 4.45 in. wide by 1.575 in. thick, and are spaced 11.05 in. center to center, leaving an unsupported length of pipe equal to 6.60 in. The working pressure is given as 278 lb. per sq. in. It is shown that the possibility of allowing a higher working stress in the rings than would be safe for the pipe, enables a reinforced pipe to be made lighter than a plain pipe, provided that the rings are sufficiently close together. Details are given of a calculation on the Los Angeles pipe, assuming a stress of 10 tons per sq. in. for the rings and 6 tons for the pipe, which shows that the spacing of the rings must be less than 12 in. clear to obtain a lighter pipe. (Paper before the British Association, abstracted through *The Engineer*, vol. 136, no. 3535, Sept. 28, 1923, p. 333, *ep*)

MOTOR-CAR ENGINEERING

Supercharger in European Grand Prix Race, W. F. Bradley. The triumph of the supercharged engine is said to be the outstanding technical feature of the European Grand Prix race, Sept. 9, 1923, which resulted in a victory for an eight-cylinder Fiat at an average of 91.03 m.p.h. The Fiat Company admitted that its success was due entirely to the use of the supercharger.

As a result of its racing experience the Fiat Company has fitted superchargers to its new 500-hp. aviation engines built for a French competition and is also using superchargers on marine engines. No details as to construction of the Fiat supercharger are given in the article. (*Automotive Industries*, vol. 49, no. 14, Oct. 4, 1923, pp. 676–677, 5 figs., *g*)

Acetylene-Driven Motor Cars. The question of the use of acetylene as a motor fuel came up soon after the armistice, in view of the scarcity and high cost of gasoline, benzol, and the like in Germany. Some tests were made, but without any especially encouraging results until Engr. Bullermann, of Hanover, succeeded in driving an automobile by using a mixture of acetylene gas with 10 to 20 per cent of liquid fuel.

The Swiss Acetylene Verein Zurich, which is interested in all applications of acetylene, published several scientific papers on this subject, among them a book by Prof. C. F. Keel (in German) under the title Acetylene in Automobile Operation. The present article is apparently based on this publication.

There are several ways (generally well known) by which acetylene can be produced. Its mixing with air may be carried out in mixing valves. Acetylene-air mixtures have to be diluted by means of an adjustable nozzle with a water spray. The power delivered

by an acetylene-fed engine may be regulated by varying either the total amount of mixture or the acetylene content only, as acetylene-air mixtures are explosive over a wide range of ratios of the two gases.

The original article describes a number of systems proposed for driving motor cars by acetylene, none of which has attained any extensive use. In the Bullermann system, which is described in detail, the acetylene gas is mixed with 10 to 20 per cent of heavy oil and an automatic mixing valve is provided.

In Sweden the Lux Company is said to have developed a process for using a mixture of benzol and acetylene dissolved in sulphite spirits.

Engr. N. H. Rustige proposes another method in which from 5 to 6 kg. of calcium carbide are dissolved in 100 kg. of 92-deg. sulphite spirits and the mixture is fed into an ordinary carburetor.

The article gives no information as to the important question of the state of the engine cylinders after a couple of thousands of miles of running on any of these fuels. (*Motor und Auto*, vol. 20, no. 17, Sept. 10, 1923, pp. 147–149, *gd*)

Hydraulic Four-Wheel Brakes for Motor Cars

HYDRAULIC FOUR-WHEEL BRAKES FOR AUTOMOTIVE VEHICLES, Malcolm Loughead.[1] Description of a hydraulic four-wheel brake system and a statement of requirements in four-wheel brake design. In this system pressure is built up in a cylinder mounted on the transmission case near the fulcrum of the brake pedal. The system consists of a master cylinder, piping, and reservoir tank. Mounted rigidly on the dust shield or anchor bracket of each one of the four wheels is a brake-band-actuating cylinder that is connected to the pressure line on the chassis frame by a suitable length of seven-ply rubber hose capable of resisting a pressure of 2000 to 2500 lb. per sq. in. before bursting.

The hose has a close-wound coil spring inserted while the hose is under a pressure of 1200 to 1400 lb. per sq. in. There is practically no expansion loss up to a pressure of 1000 lb. per sq. in., this being a very important factor with hydraulic brakes because two movements, those of steering and of spring action, must be provided for by using flexible connections. An expansion loss in the hydraulic system causes a lessening of the amount of pedal travel; to compensate for this loss it is necessary to reduce the amount of pedal leverage, and this would require a greater pedal pressure.

Each of the individual brake-actuating cylinders on the four brake supports contains a pair of opposed pistons, one at either end of the cylinder. See Fig. 6. These pistons act against two levers that are in turn connected to the brake-band ends, the brake bands being of the external contracting type. Liquid is admitted to these brake-actuating cylinders between their opposed pistons through an opening at the cylinder centers. When the brake pedal is depressed, the opposed pistons in each cylinder are forced apart by the hydraulic pressure set up in the system by the master cylinder; one end of each of the levers in each brake-actuating cylinder bears on the head of one of its opposed pistons and the other end exerts a pull on the brake-band end, drawing it tangent to the drum. Smooth brake action is assured by drawing the brake-band ends in a line tangent to the brake drum and not allowing the ends to "snub." Since the opposed pistons are forced apart by hydraulic pressure, it follows that the pressure on both pistons in all four brake-actuating cylinders must be equal. The brake-actuating-cylinder group assembly is shown in detail in Fig. 6.

A mixture of alcohol and glycerine, 40 per cent alcohol and 60 per cent glycerine, constitutes the liquid used in the hydraulic braking system. Any leakage of liquid from the system is compensated for from a small reservoir mounted on the dash that replenishes the master cylinder automatically. When the master-cylinder piston is in the "off" position, it uncovers several small port holes, each about 0.02 in. in diameter, that communicate directly with the reservoir. This allows a free flow of liquid from the tank to the master cylinder and replenishes any loss of liquid that may occur during the application of the brakes. If there is any loss of liquid, it is very slight; in fact, cars have been run for several months with a closed line and have lost practically none of the fluid. Rawhide is used to pack the pistons and prevent any leakage of the fluid from the hydraulic cylinders.

From this the author proceeds to discuss the six essential factors of design of a four-wheel braking system. These factors are: (1) Reliability, (2) equalization, (3) stopping ability, (4) control, (5) simple adjustments and minimized service requirements, (6) wear and replacement of parts. (*The Journal of the Society of Automotive Engineers*, vol. 13, no. 4, October, 1923, original paper pp. 313–316 and discussion pp. 316–321, 3 figs., *d*)

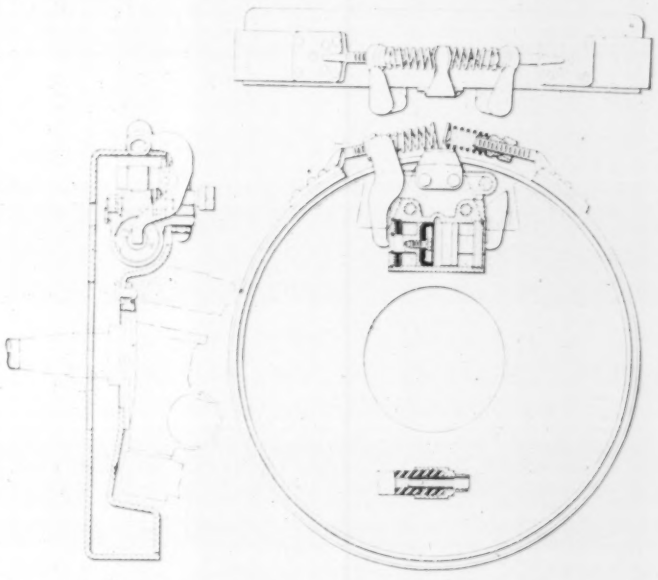

FIG. 6 WHEEL CYLINDER GROUP ASSEMBLY WITH A SECTION OF THE HOSE END SHOWN IN THE LOWER SECTION

[1] Chief Engineer, Hydraulic Brake Co., Detroit, Mich.

ORDNANCE

THE GERMAN LONG-RANGE GUN, H. W. Miller. The article is based on material previously published, among which is an article by Lt.-Col. H. W. Miller, U. S. A., published in MECHANICAL ENGINEERING, February, 1920, pp. 89–100; some of the material, however, is not generally accessible.

The most interesting part of the article is the relationship between height and length of trajectory for the long-distance guns. It would appear the German calculations indicated that if a projectile could be given an initial velocity of approximately 1600 m. (5250 ft.) per sec., it would traverse a distance of 72 miles if started at an elevation of 55 deg., because during most of its period of travel it would be passing through atmosphere of such rarity as to oppose relatively little resistance to its flights, and cross-currents of air would have relatively little tendency to cause the projectile to drift off its theoretical path. According to information secured by the American Army Commission on its visit to the Skoda Works at Pilsen in May, 1919, the German investigations showed the following relation between muzzle velocity and elevation for maximum range:

Muzzle Velocity		
Meters per sec.	Ft. per sec.	Elevation for maximum range
750	2460	42 deg.
850	2790	50 deg.
900	2950	52 deg.
1600	5250	55 deg.

The results of calculations also indicated that for a gun having a range of, say, 100 km., the economic diameter was about 8 in., the weight of the projectile about 264 lb., the powder charge 525 lb., and the powder chamber about 10 ft. long and cylindrical to receive the metal case in which the charge would be contained. To secure the velocity of 1600 meters (5250 ft.) per second the gun would have to be at least 140 calibers long. (*Army Ordnance*, vol. 4, no. 20, Sept.-Oct., 1923, pp. 98–100 and 122–123; to be continued, *d*)

POWER-PLANT ENGINEERING (See also Testing and Measurements)

Steam Turbines—Last-Stage Expansion

DEVELOPMENT OF THE STEAM TURBINE, Stanley S. Cook.[1] Lecture delivered before the Royal Society of Arts, May 7, 1923, dealing in the first part with marine turbines and in the second with matters pertaining to both marine and land turbines.

In the first part a good deal of attention is paid to the subject of gearing and thrust blocks. The author describes the first marine double-reduction-gear installation which was fitted in the S. S. *Somerset*, a steamer of 4500 s.hp. An interesting feature of this installation is that it comprises three turbines—a high-pressure and an intermediate turbine on one side of the main gear and a low-pressure turbine on the other. The subdivision of the high-pressure unit into high and intermediate is said to bring several advantages. It enables the turbines to be given higher revolutions and smaller

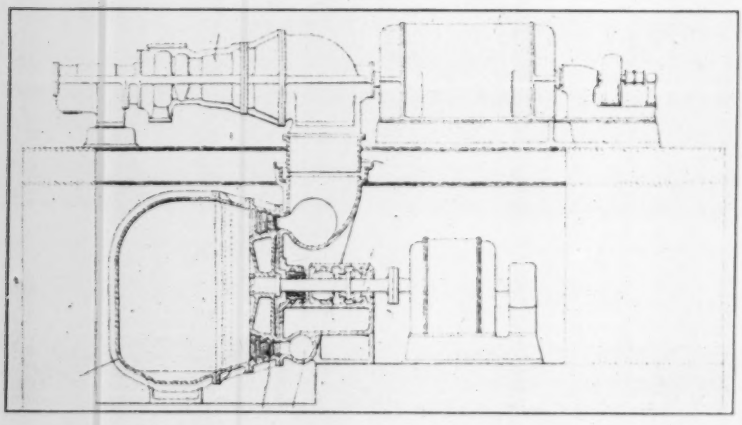

FIG. 7 POWER-PLANT ARRANGEMENT INVOLVING SUPPLEMENTARY TURBINE AS SUBSTITUTE FOR THE LAST STAGES OF MAIN TURBINE

diameter with considerable gain in efficiency and more rigid construction and increased reliability. The *Somerset*, which was built about 1918, has steamed a distance of over 200,000 miles up to the present time. Since that time over 200 British-built mercantile vessels have been fitted with double-reduction-gear turbines. For the sake of simplicity in the construction of gearing in some installations with three turbines the high-pressure and intermediate-pressure turbines have been arranged in tandem driving one primary pinion, while the low-pressure turbines drive the other.

The author describes various ways of blade fitting and formation as well as methods of attaching the blades. A brief discussion of the relative efficiencies of the various types of blading is given.

The subject of the ability of the turbine to utilize large expansion ratios and extract the energy from the steam down to the lowest limits of pressure is discussed in some detail. The author believes that possibly the best solution of the whole exhaust-area problem in large machines is to reduce the revolutions of the last portion of the turbine in a supplementary turbine arranged in the closest possible proximity to the condenser. This enables large areas to be provided without excessive stress in the blades or in the disks which carry them. Fig. 7 shows an arrangement of this nature. (*Journal of the Royal Society of Arts*, vol. 71, no. 3696, Sept. 21, 1923, pp. 743–760, 20 figs., *hg*)

RAILROAD ENGINEERING (See also Testing and Measurements)

ONE-PIECE CAST-STEEL FREIGHT-CAR UNDERFRAME. Description of a one-piece steel underframe cast by the Commonwealth Steel Co., for the Southern Pacific, which road has recently applied underframes of this type to ten new 80,000-lb. capacity double-sheathed box cars.

The real reason why this type of frame has not been used more extensively before has lain in the difficulty of successfully casting large unit frames with thin sections. As it is, the unit cast-steel underframe, center sills, and body bolsters bring the light weight of the cars up to 46,600 lb. as compared with 46,270 lb. for similar cars with a built-up underframe. Further refinement is expected to make possible the reduction of this weight.

The original article contains drawings showing the principal dimensions and sections of the new underframe. It is cast so as to form two center sills, each of Z-section, 9 in. high, $^3/_4$ in. thick in the web, and $^7/_8$ in. thick through the flanges. These are approximately 30 ft. long between the inside flanges of the body bolsters.

The new development is of particular interest at a time when the railroads are being urged to adopt a standard underframe of rolled sections. (*Railway Review*, vol. 73, no. 13, Sept. 29, 1923, pp. 447–449, *d*)

Reinforced-Concrete Freight Cars

FREIGHT CARS MADE OF REINFORCED CONCRETE, Professor Kleinlogel. Experiments made about three years ago at the car shops of H. Fuchs, Heidelberg, Germany, led to the construction of a 20-ton coal car built for a portland cement works company. This car has said to have given satisfactory service for a considerable time.

About the same time (1919 or 1920) the same shops built a 15-ton freight car of the standard open type. This car was used for certain experiments. For example, it was run with speeds up to 21 km. per hr. into stop blocks placed on one rail and also into steel cars placed in its way. After each of these tests it was subjected to a careful and thorough examination. During the first experiments the car was run empty; afterward it was loaded with 17 tons of ore. The shock of collision was sometimes so tremendous that it could be heard for miles. Notwithstanding this the reinforced-concrete frame stood the tests admirably. No alteration in the condition of the fastenings and no crack in the construction could be ascertained.

The dead weight of the reinforced-concrete car is somewhat greater than that of the steel car, but the former is said to run much steadier than the latter. It is claimed that it is less subject to wear and that there is no danger of its rusting. Fig. 8 shows a sketch of the 15-ton reinforced-concrete car. (*Engineering Progress*, vol. 4, no. 8, Aug., 1923, pp. 164, 3 figs., *d*)

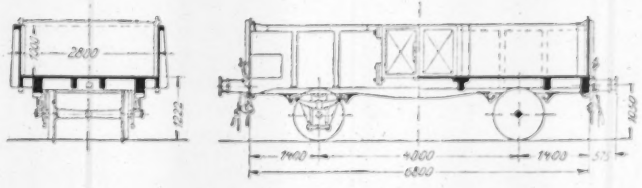

FIG. 8 SKETCH OF A 15-TON REINFORCED-CONCRETE CAR

AMERICAN LOCOMOTIVES IN FRANCE, M. Lunier.[1] In 1921 the Paris-Orleans Railway placed in service 50 Pacific-type locomotives with simple cylinders and superheaters built by the American Locomotive Company. They are essentially of American design, with some modifications, however, suggested by French practice. Thus the piston valves are of the French type and have inside admission.

In addition to the usual American equipment the locomotives were equipped with a speed indicator and recorder. In regular service these machines proved to be more efficient than the French compound locomotives and had a smaller fuel consumption. These locomotives, in which the superheating surface is 775 sq. ft. as against 684 sq. ft. for the four-cylinder compound locomotives with which they are compared, operate in general with a temperature of superheated steam at the admission to the cylinders higher than that which can be obtained with the compound.

During the comparative tests made in July and August, 1921, the average temperature of the superheated steam was 642 deg. fahr. on the simple locomotive and only 556 deg. fahr. on the compound locomotive for identical trains. This temperature was measured by means of a Fournier pyrometer of the most recent type,

[1] Parsons Marine Turbine Co., England.

[1] Inspector of Equipment, Paris-Orleans Railway.

having in place of the old cylinder reservoir with a protecting bushing, a reservoir formed of helical tube plunged directly into the current of steam. (*Railway Mechanical Engineer*, vol. 7, no. 10, Oct., 1923, pp. 679–680, 2 figs., *d*)

REFRIGERATION

COLD AS A METHOD OF ENERGY ACCUMULATION, Edmund Altenkirch. The author discusses in considerable detail the use of refrigeration as a means for the accumulation of energy. The basis of his views was explained in his paper before the International Congress for Refrigeration in 1913. (Compare *The Journal of The American Society of Mechanical Engineers*, vol. 35, no. 10, Oct., 1913, p. 1574 and MECHANICAL ENGINEERING, vol. 44, no. 5, May, 1922, pp. 320–321.) (*Zeitschrift für des gesamte Kälte-Industrie*, vol. 30, no. 8, Aug., 1923, pp. 89–93, 1 fig., *tm*)

SPECIAL MACHINERY

REELING AND STRAIGHTENING MACHINES, W. H. A. Robertson. The first of a series of articles, of interest because while machines of this character have been used for a long time, there is comparatively little published information on their design. The present article describes only standard types and, in particular, the standard straightening machine and bar reeling machines, beginning with the first machine designed in 1865 by James Robertson. Bar reeling machines with chain-driven rollers and the conventional type of tube reeling machines have tubes ranging from 10 to 24 in. in diameter. (*Machinery* (Lond.), vol. 23, no. 575, Oct. 4, 1923, pp. 21–24, 8 figs., *d*)

TESTING AND MEASUREMENTS

THE RELATION BETWEEN THE DYNAMIC AND THE STATIC TENSILE TESTS, Harold Albert Nisley. The purpose of the investigation was to determine the relation between the static test and the impact test, and among other things to compare the amounts of energy absorbed by specimens of a given material when ruptured under static and dynamic conditions. A number of attempts have been made to develop a definite percentage relationship between the results obtained by the two methods. The conclusions arrived at in the various cases have been more or less conflicting.

In this investigation a particular steel was selected and its structure made to vary over a wide range by widely differing heat treatments. In the case of the static tests, the corresponding loads, elongations, and reductions of area were recorded for each specimen through the ultimate up to the point of rupture. The total work done was then determined in each case by integrating the plotted results. Thus it was possible to make a direct comparison of the total energy required for rupture of specimens when tested statically and when tested dynamically.

The dynamic tests were carried out on a Charpy machine of 300 kg-m. capacity, while for the static tests a Riehlé machine was used. The steel selected for this investigation was a plain carbon steel containing 0.39 carbon, 0.70 manganese, 0.263 silicon, 0.34 nickel, 0.11 chromium, 0.048 phosphorus, and 0.043 sulphur. To obtain a wide range of variations of internal structure, six different heat treatments were applied. The details of these are specified in the original article.

The comparative results are presented in the form of a table. From these it would appear that there is no fixed percentage relationship between the results obtained on a particular steel by so-called static and dynamic tensile tests. This relationship is apparently a function of the structure imparted to the steel by different treatments. However, the variation of the relationship is not large and seems to be confined to a certain limited range. From the data obtainable from static tensile tests on this particular steel, the reduction of area seems to be the best criterion of the shock-resisting qualities of the material. (Paper submitted in partial fulfillment of the requirements for the degree of Master of Science in Mechanical Engineering from the Massachusetts Institute of Technology, 1923, under the direction of the Faculty Board of the Ordnance School at Watertown Arsenal. Abstracted through *Army Ordnance*, vol. 4, no. 20, September-October, 1923, pp. 88–93, 4 figs., *e*)

A Vibration Testing Machine

DETERMINATION OF MECHANICAL PROBLEMS BY MEANS OF VIBRATION TESTS, C. Bethel.[1] Mechanical performance under vibration cannot, as a rule, be calculated. This is because little is known about the nature of the majority of vibrations. Designs for service involving vibration are made very largely from experience, which is in some cases a long and expensive method.

More satisfactory results can be obtained if the nature of the effect of the vibration is first determined by test. In some cases this can be done by testing a piece of apparatus on the vibrating machine. Several of these have been developed during the last few years for different classes of testing. For example, a special machine to test locomotive collector rings; a hammer-type machine for low-frequency vibration tests, as tests on bearing flanges. The author describes in particular a vibrating machine of the disk type built for general vibration testing.

In this machine the part to be tested is clamped on the table which is supported by the bearings of the upper disk. The vibration is caused by flat places machined on the lower disk and may be varied in intensity by varying the contact pressure between the disks by compressed air. The floating disk and table are held against the driver disk by air pistons, and the character of the vibration may be changed by changing the air pressure on the pistons. The same is true of a change in the speed of the machine. It is very important to make vibration machines rugged, and this machine is sufficiently so to enable the operator to start it and then go about other work elsewhere, returning to it occasionally to note the condition of the test. The vibration produced is so severe that it is distinctly uncomfortable to be in the same room with the machine.

This machine successfully reproduces a large number of service conditions and gives a means of shortening development enormously. Some of the more common classes of vibrations met with are: (*a*) High-frequency vibration; (*b*) combination of high-frequency vibration with shocks or impacts, and (*c*) impacts.

Brushholder parts afford a very good example of the first class. They are subjected to a very high-frequency vibration. This vibration often results in a disastrous wear of all of the moving brushholder parts. The machine has been used to improve these parts.

Railway-motor gear cases are subjected to the second class of vibration. This is a case of the combination of practically every vibration to which the motor is subjected, from a high-frequency gear vibration to the more or less infrequent road shocks. The magnitude of these forces cannot be calculated but they can be reproduced on the vibrating machine, and the gear-case failures on the machine compare in every way with service failures.

Bearing vibration comes under the third class. It consists mostly of more or less infrequent shocks, with very little high-frequency vibration. The shocks are often of sufficient severity to cause failures of the babbitt. Vibration tests afford a quick means of determining the best babbitt and method of anchoring for a given bearing and service.

The list could be extended almost indefinitely, but the examples mentioned will convey an idea of the different kinds of vibration which are encountered every day and for which there is no known means of calculating. Most problems of this kind may be solved by reproducing them on a vibrating machine.

The results of these tests have shown the great value of reproducing service vibrations experimentally to determine the ability of a piece of apparatus to meet actual service requirements. By weeding out the weakest parts of a piece of apparatus, its useful life and range of application are greatly extended. (*The Electric Journal*, vol. 20, no. 10, Oct., 1923, pp. 371–373, 5 figs., *dp*)

A Carbon Monoxide Meter

A CARBON MONOXIDE METER. Description of an apparatus for determining the carbon monoxide content of flue gases electrically. This is of interest because precise control of the percentage of CO in flue gases may be of considerable importance under certain conditions.

The operation of the meter is based on the catalytic action of heated platinum wire in producing combustion of CO with oxygen.

[1] Motor Engineering Dept., Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Referring to Fig. 9, *A* and *B* are two small platinum wires, each passing through the center of cylindrical chambers in two separate metal blocks. *B* is the comparison wire and *A* is the measuring wire in the chamber through which the sample of flue gas passes slowly. The wires are heated to a temperature of about 800 deg. fahr. by an electric current. Usually enough oxygen is present in the waste gases for the combustion of the CO and hydrogen, but to make certain of this, air to the amount of 20 per cent of the gas volume is admitted through the small passage *E*, Fig. 10. The catalytic action causes the CO and H_2 to burn along the surface of the wire *A*, thereby raising its temperature and increasing the resistance in almost exact proportion to the amount of these gases present. When considerable amounts of CO are present the wire is heated to a brilliant glow. As *B* maintains instant temperature and resistance, the Wheatstone-bridge circuit, consisting of the wires *A* and *B*, and the resistances *C* and *D*, becomes unbalanced and causes an indication on the galvanometers *F* and *H*. These instruments are calibrated in percentage of CO or CO plus H_2. As the combustion heat of a given volume of H_2 is almost identical with that of CO, the CO meter may serve for a mixture containing both gases. For boiler-house practice it is not necessary to know what fraction of the sum is CO and what fraction is H_2; the important thing is the indication that these combustibles are present and to what extent combustion is incomplete. Methane or other hydrocarbons are not indicated, but they occur only in small quantities except where the CO content is extremely high.

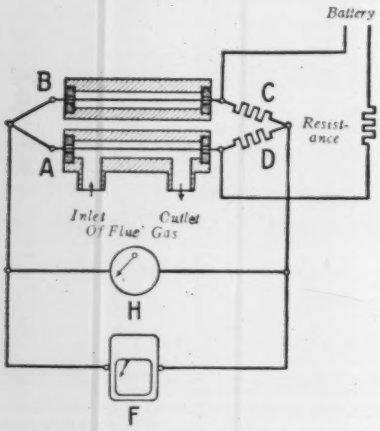

FIG. 9 DIAGRAMMATIC SKETCH OF CO METER

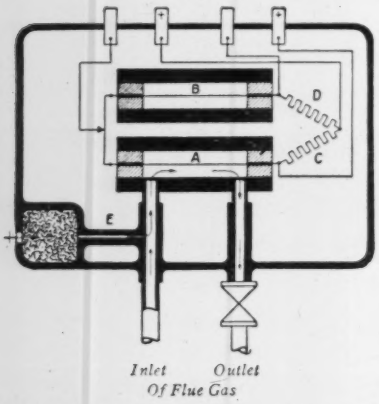

FIG. 10 DIAGRAMMATIC SKETCH OF CO METER

The galvanometer *H*, Fig. 9, is a waterproof wall-type instrument suitable for mounting on the front of the boiler, and *F* is a recorder usually placed in the superintendent's office.

The CO meter requires across its terminals a voltage of 2.7 and the current passing through the Wheatstone bridge of the CO meter amounts at this voltage to 0.85 ampere. To supply this current a storage battery may be used or the CO meter may be connected to a direct-current line of 120 or 240 volts; in both cases a suitable resistance must be provided in series with the CO meter to keep the current within the given limit of 0.85 ampere.

In general, the indications of combustible gases by this instrument are accurate within a few tenths of one per cent. Greater accuracy than this cannot be expected, and in practice is not necessary. What is required is a sure indication that combustible gases are being wasted, and this the carbon monoxide meter, it is stated, cannot fail to show if properly installed. (*Fuels and Furnaces*, vol. 1, no. 6, Oct., 1923, pp. 471–474, 4 figs., *d*)

THERMODYNAMICS (See also Refrigeration)

Variation of Specific Heat of Gases with Temperature

VARIATION OF SPECIFIC HEAT OF GASES WITH TEMPERATURE ACCORDING TO THE MOST RECENT INVESTIGATIONS, H. Muraour. Data based on the work of Holborn and Henning and used more recently by Pier and Bjerrum at the Nernst Laboratory.

The results obtained at the Nernst Laboratory would lead one to adopt, at least for high temperatures, in particular for diatomic gases, values of specific heats materially different from those obtained by the use of the equations of Mallard and LeChatelier, as would appear from the curves of Fig. 11 and tables in the original article.

Apparently from Fig. 11 the new values of specific heats do not lend themselves to expression by a linear formula, in particular in the case of carbon dioxide and water vapor. For practical purposes, however, Kast has proposed the use of the formula usually employed for the computation of temperatures of explosion with certain variations. The ordinary formula is

$$t = \frac{-A \sqrt{A^2 + 4bQ}}{2b}$$

and Kast has proposed the following straight-line formulas for calculating, namely,

For diatomic gases.....	$4.8 + 0.00045\,t$
For carbon dioxide.....	$9.0 + 0.00058\,t$
For water vapor.....	$4.0 + 0.00215\,t$

By means of these formulas Kast has calculated the probable values of the mean specific molecular heats at constant volume

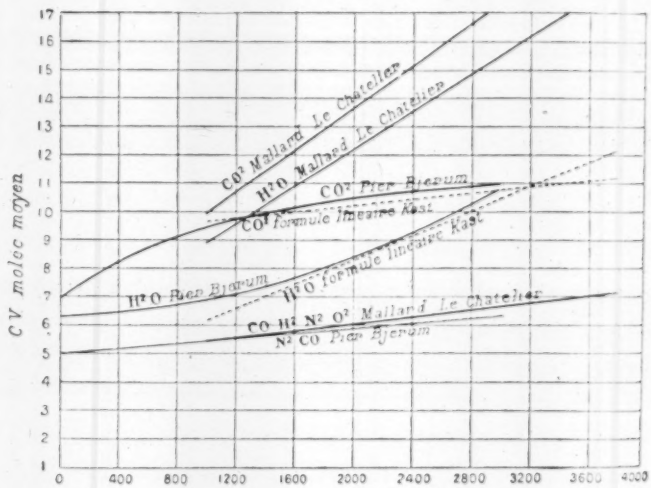

FIG. 11 CURVES OF SPECIFIC HEATS OF VARIOUS GASES AT HIGH TEMPERATURES

(*C. V. molec moyen* = true mean molecular heat; *formule linéaire* = straight-line equation. The abscissas are in degrees centigrade.)

between 0 deg. cent. and *t* deg. cent. for the region of 3000 to 4000 deg. These are:

	Temperature, Deg. Cent.					
	3000	3200	3400	3600	3800	4000
Diatomic gases.....	6.1	6.2	6.3	6.4	6.5	6.6
Carbon dioxide.....	10.95	11.1	11.2	11.4	11.45	11.5
Water vapor.....	10.5	10.9	11.4	11.7	12.1	12.5

It should be noted that these values, in particular those for water vapor, have been obtained not by measurement but by extrapolation and should not be considered as fully reliable.

The specific heats of methane, ethylene, acetylene, and benzol are also discussed, likewise the industrial applications of the new values.

A bibliography of the subject comprising references dating back to 1880 is appended to the article. (*Chimie & Industrie*, vol. 10, no. 1, July, 1923, pp. 23–29, 1 fig., *t*)

CLASSIFICATION OF ARTICLES

Articles appearing in the Survey are classified as *c* comparative; *d* descriptive; *e* experimental; *g* general; *h* historical; *m* mathematical; *p* practical; *s* statistical; *t* theoretical. Articles of especial merit are rated *A* by the reviewer. Opinions expressed are those of the reviewer, not of the Society.

Second Revision of A.S.M.E. Boiler Code

PROPOSED revisions of the A.S.M.E. Boiler Code have, as a result of the recent revision work of the Boiler Code Committee, been published in the following issues of MECHANICAL ENGINEERING:

July, 1922,	page 460	April, 1923,	page 263
August, 1922	page 544	May, 1923,	page 318
December, 1922,	page 850	June, 1923	page 379

The Public Hearing required in connection with the discussion of the proposed revisions was held on December 4, 1922, in connection with the Annual Meeting of the Society. As a result of the suggestions received at this Public Hearing much further careful consideration has been given to the revision schedule by the Boiler Code Committee during the current year which has resulted in the further schedule of proposed modifications of both the Power Boiler Section of the Code and the material specifications section. These modifications are here presented for the information of every one interested in the application of the A.S.M.E. Boiler Code.

It is the request of the Committee that these revisions be fully and freely discussed so that it may be possible for any one to suggest changes before the rules are brought to final form and presented to the Council for approval. Discussions should be mailed to C. W. Obert, Secretary of the Boiler Code Committee, 29 West 39th St., New York, N. Y., in order that they may be considered by the Boiler Code Committee.

The revisions here published embrace paragraphs that appeared in the 1918 Edition of the A.S.M.E. Boiler Code and all paragraphs without prefix letters refer to paragraphs of similar number in that edition. In addition, however, there are presented revisions of the material specifications that have been approved by the Boiler Code Committee to replace specifications in the present edition of the Code; all of these specifications which are designated in the paragraph numbers by the prefix letter S are here presented as modifications of the similar specifications published in the June, 1923 issue of MECHANICAL ENGINEERING, pages 379 to 383.

There are also included proposed revisions of the new requirements pertaining to specifications for pipe, pipe material, and fittings used on steam boilers which new rules were originally presented in the December, 1922 issue of MECHANICAL ENGINEERING, under the special paragraph number designations of the prefix letter X; of these it is proposed to incorporate paragraphs X-1 to X-6 in the Power Boiler Section of the Code, whereas the specifications for steel and wrought-iron pipe will be incorporated in the material specifications of the Code.

Boiler Code Revisions

PAR. 6 REVISED:

6 Steel bars or structural shapes for braces and for other boiler parts, except as otherwise specified herein, shall be of the quality designated in the Specifications for Steel Bars.

PAR. 9 REVISE PARAGRAPH AS PRINTED IN MAY, 1923, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

9 The use of bessemer steel is prohibited for the pressure parts of boilers. When the maximum allowable working pressure exceeds 160 lb. per sq. in., cross-pipes connecting the steam and water drums of water-tube boilers, headers, cross-boxes and all pressure parts of the boiler proper over 2-in. pipe size, or equivalent cross-sectional area shall be of wrought steel, or cast steel of Class B grade, as designated in the Specifications for Steel Castings. Malleable iron as designated in the Specifications for Malleable Castings may be also used when the maximum allowable working pressure does not exceed 350 lb. per sq. in., provided the form and size of the internal cross-section perpendicular to the longest dimension of the box is such that it will fall within a 7-in. by 7-in. rectangle. Seamless tubes or lap-welded pipe may be used for drums or other pressure parts of a boiler provided such tubes or pipes conform to the Specifications for Lap-Welded and Seamless Boiler Tubes, for Steel Pipe or for Wrought-Iron Pipe.

PAR. 21 REVISE PARAGRAPH AS PRINTED IN MAY, 1923, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

21 *Tubes and Nipples for Water-Tube Boilers.* The maximum allowable working pressures for steel or wrought-iron tubes or nipples used in water-tube boilers shall be for the various diameters and minimum gages measured by Birmingham wire gage, as given in Tables 2*a* or 2*b*. Open-hearth steel pipe or wrought-iron pipe not to exceed 1 1/2 in. standard pipe size which meets the pipe specifications may be used for water-tube boilers for a working pressure not to exceed 250 lb. per sq. in., when screwed in the sheet, provided the wall thickness is at least 50 per cent greater than the minimum wall thickness required by Table 2*a* or 2*b*. The maximum allowable working pressure for copper tubes or nipples used in water-tube boilers, shall be for the various diameters and minimum gages measured by Birmingham wire gage as given in Table 2 1/2, but not to be used for pressures to exceed 250 lb. Copper tubes shall not be used with superheated steam.

PAR. 22 REVISE PARAGRAPH AS PRINTED IN APRIL, 1923, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

22 *Tubes for Fire-Tube Boilers.* The minimum thicknesses of tubes used in fire-tube boilers measured by Birmingham wire gage for maximum allowable working pressures not exceeding 175 lb. per sq. in., shall be as follows:

MAXIMUM ALLOWABLE WORKING PRESSURES FOR STEEL OR WROUGHT-IRON TUBES OR NIPPLES FOR FIRE-TUBE BOILERS

	Gage—B.W.G.	
	Steel or Wrought Iron	Copper
Diameters 1 in. or over, but less than 2 1/2 in.	13	10
Diameters 2 1/2 in. or over, but less than 3 1/4 in.	12	8
Diameters 3 1/4 in. or over, but less than 4 in.	11	7
Diameters 4 in. or over, but less than 5 in.	10	6
Diameter 5 in.	9	5

For each increase of one gage in thickness above that shown in the table, the maximum allowable working pressure will be increased by 200 lb. divided by the diameter of the tube in inches.

Copper boiler tubes shall not be used for pressures above 250 lb. per sq. in., or where the temperature of the water or steam in contact with tubes subjected to external pressure is in excess of 406 deg. fahr.

TABLE 2 1/2 REVISE HEADING AS PRINTED IN MAY, 1923, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

TABLE 2 1/2 MAXIMUM ALLOWABLE WORKING PRESSURES FOR COPPER TUBES FOR WATER-TUBE BOILERS AND BOILERS WITH TUBES SUBJECTED TO EXTERNAL PRESSURE

(For use at pressures not to exceed 250 lb. per sq. in. or temperatures not to exceed 406 deg. fahr.)

PAR. 28*c* REWORD THIS SECTION AS FOLLOWS, AND RENUMBER AS PAR. 3*b*

3*b* If desired, both flange and firebox steel of lower tensile strength than specified may be used for an entire boiler or part thereof, the desired tensile limits to be specified with a range of 10,000 lb. per sq. in. All such steel shall conform to the Specifications for Steel Boiler Plate, excepting that the lower limit for carbon in the case of firebox steel may be less than 0.12 per cent for steels having the lower tensile strength.

PAR. 185 REVISE PARAGRAPH AS PRINTED IN MAY, 1923, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

185 When shell plates exceed 5/8 in. in thickness in horizontal-return-tubular boilers, the portion of the plates forming the laps of the circumferential joints, where exposed to the fire or products of combustion, shall be planed or milled down as shown in Fig. 8, to a thickness of not over 9/16 in. provided the requirement in Par. 184 is complied with. The fillet at the edge of the planing may be not less than 1 in. radius.

PAR. 186 REVISED:

186 *Welded Joints.* The ultimate strength of a joint which has been properly welded by the forging process, shall be taken as 35,000 lb. per sq. in., with steel plates having a range in tensile strength of 45,000 to 55,000 lb. per sq. in. Autogenous welding

TABLE 2*a* MAXIMUM ALLOWABLE WORKING PRESSURES FOR SEAMLESS AND LAP-WELDED STEEL TUBES OR NIPPLES FOR WATER-TUBE BOILERS FOR DIFFERENT DIAMETERS AND GAGES OF TUBES

Outside diam. of tube in inches, D	Minimum Gage—B.W.G.												
	17 $t = 0.058$	16 $t = 0.065$	15 $t = 0.072$	14 $t = 0.083$	13 $t = 0.095$	12 $t = 0.109$	11 $t = 0.120$	10 $t = 0.134$	9 $t = 0.148$	8 $t = 0.165$	7 $t = 0.180$	6 $t = 0.203$	5 $t = 0.220$
1/2	434	686	...	...	...	...	...	...	...	...	...	...	...
3/4	206	374	542	806	...	...	...	...	...	...	...	...	...
1	...	218	344	542	758	...	...	...	...	...	...	...	...
1 1/8	...	166	278	454	646	870	...	...	...	...	...	...	...
1 1/4	...	124	225	383	557	758	...	...	...	...	...	...	...
1 1/2	...	...	146	278	422	590	722	...	...	...	...	...	...
1 3/4	...	...	...	203	326	470	583	727	871	...	...	...	...
2	...	...	...	146	254	380	479	605	731	...	...	...	...
2 1/4	...	...	...	...	198	310	398	510	622	758	...	...	...
2 1/2	...	...	...	...	153	254	333	434	535	657	765	...	...
2 3/4	...	...	...	...	117	208	280	372	464	575	673	824	...
3	...	...	...	...	...	170	236	320	404	506	596	734	836
3 1/4	...	...	...	...	...	...	199	276	354	448	531	658	752
3 1/2	...	...	...	...	...	...	167	238	310	398	475	594	681
3 3/4	...	...	...	...	...	...	139	206	273	355	427	537	619
4	...	...	...	...	...	...	...	178	240	317	385	488	565
4 1/2	...	...	...	...	...	...	...	...	186	254	314	406	474
5	...	...	...	...	...	...	...	...	142	204	258	340	402

Provided the working pressure for lap welded steel tubes does not exceed

$$P = \frac{(t - 0.039)}{D} 18{,}000 - 250$$

$$P = \frac{(t - 0.039)}{D} 14{,}000$$

where P = maximum allowable working pressure, lb. per sq. in.
t = thickness of tube wall, in.
D = outside diameter of tube, in.

For pressures in excess of those given in the table, formulas shall govern.

NOTE: Maximum allowable working pressures for superheater tubes shall be the same as for boiler tubes.

TABLE 2*b* MAXIMUM ALLOWABLE WORKING PRESSURES FOR LAP-WELDED WROUGHT-IRON TUBES OR NIPPLES FOR WATER-TUBE BOILERS FOR DIFFERENT DIAMETERS AND GAGES OF TUBES

Outside diam of tube in inches, D	Minimum Gage—B.W.G.												
	17 $t = 0.058$	16 $t = 0.065$	15 $t = 0.072$	14 $t = 0.083$	13 $t = 0.095$	12 $t = 0.109$	11 $t = 0.120$	10 $t = 0.134$	9 $t = 0.148$	8 $t = 0.165$	7 $t = 0.180$	6 $t = 0.203$	5 $t = 0.220$
1/2	402	551	760	934	...	...	...	...	...	...	...	...	...
3/4	206	367	466	622	791	...	...	...	...	...	...	...	...
1	...	218	344	466	593	742	...	...	...	...	...	...	...
1 1/8	...	166	278	415	527	660	763	...	...	...	...	...	...
1 1/4	...	124	225	373	475	593	687	805	...	...	...	...	...
1 1/2	...	...	146	278	396	494	572	670	770	...	...	...	...
1 3/4	...	...	...	203	326	424	490	575	660	763	...	...	...
2	...	...	...	146	254	371	430	502	577	668	747	...	...
2 1/4	...	...	...	...	198	310	382	447	513	594	665	773	...
2 1/2	...	...	...	...	153	254	333	401	462	535	598	696	766
2 3/4	...	...	...	...	117	208	280	366	420	485	543	633	697
3	...	...	...	...	...	170	236	320	385	445	497	580	639
3 1/4	...	...	...	...	...	...	199	276	354	411	460	535	590
3 1/2	...	...	...	...	...	...	167	238	310	382	427	496	548
3 3/4	...	...	...	...	...	...	139	206	273	355	399	464	511
4	...	...	...	...	...	...	...	178	240	317	374	435	480
4 1/2	...	...	...	...	...	...	...	...	186	254	314	387	426
5	...	...	...	...	...	...	...	...	142	204	258	340	383

Provided the working pressure does not exceed

$$P = \frac{(t - 0.039)}{D} 18{,}000 - 250$$

$$P = \frac{(t - 0.039)}{D} 10{,}600$$

where P = maximum allowable working pressure, lb. per sq. in.
t = thickness of tube wall, in.
D = outside diameter of tube, in.

For pressures in excess of those given in the table the formula shall govern.

NOTE: Maximum allowable working pressure for superheater tubes shall be the same as for boiler tubes.

may be used in boilers in cases where the strain is carried by other construction which conforms to the requirements of the Code and where the safety of the structure is not dependent upon the strength of the weld.

PAR. 190 CANCEL REVISION PRINTED IN MAY, 1923, ISSUE OF MECHANICAL ENGINEERING.

PAR. 199 REVISE VALUE OF C = 135 AS PRINTED IN DECEMBER, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

$C = 135$ for stays screwed through plates and fitted with single nuts outside of plate or with inside and outside nuts omitting washers (see Par. 203).

PAR. 201 REVISE PARAGRAPH AS PRINTED IN JULY, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

201 *Structural Reinforcements.* When channel irons or other structural shapes are securely riveted to the boiler heads for attaching through stays, the transverse stress on such members shall not exceed 12,500 lb. per sq. in. In computing the stress, the section modulus of the member shall be used without addition for the strength of the plate. The spacing of the rivets over the supported surface shall be determined by the formula in Par. 199 using 135 for the value of C.

If the outstanding legs of the two members are fastened together so that they act as one member in resisting the bending action produced by the load on the rivets attaching the members to the head of the boiler, and provided that the spacing of these rivets attaching the members to the head is approximately uniform, the members may be computed as a single beam uniformly loaded and supported at the points where the through braces are attached.

TABLE 5 REVISED:

TABLE 5 MAXIMUM ALLOWABLE STRESSES FOR STAYBOLTS AND STAYS OR BRACES

	Description of staybolts and stays or braces	Stresses, lb. per sq. in. For lengths between supports not exceeding 120 diameters[1]	Stresses, lb. per sq. in. For lengths between supports exceeding 120 diameters[1]
a	Unwelded or flexible staybolts less than twenty diameters[1] long, screwed through plates with ends riveted over	7,500	....
b	Hollow steel staybolts less than twenty diameters[1] long, screwed through plates with ends riveted over	8,000	....
c	Unwelded stays or braces and unwelded portions of welded stays or braces	9,500	8,500
d	Steel through stays or braces exceeding 1 1/2 in. diameter[1]	10,400	9,000
e	Welded portions of stays or braces	6,000	6,000

[1] Diameters taken at body of stay

PAR. 245 REVISED:

245 *Cast-Iron and Malleable-Iron Headers.* The pressure allowed on a water-tube boiler shall not exceed 160 lb. per sq. in. when the tubes are secured to cast-iron headers, nor 350 lb. per sq. in. when the tubes are secured to malleable-iron headers. The

form and size of the internal cross-section perpendicular to the longer axis of a cast-iron or malleable-iron header at any point shall be such that it will fall within a 7 in. by 7 in. rectangle.

PAR. 246 REVISED:

246*a* The cast iron used for the headers of water-tube boilers shall conform to the Specifications for Gray-Iron Castings given in Pars. ———, the header to be arbitrarily classified as a "medium casting" as to physical properties and tests, and as a "light casting" as to chemical properties. The malleable iron used for headers of water-tube boilers shall conform to the Specifications for Malleable Castings given in Pars. ————.

b A cast-iron header when tested to destruction, shall withstand a hydrostatic pressure of at least 1200 lb. per sq. in. and a malleable iron header 2250 lb. A hydrostatic test applied to all new headers or elements with tube attached shall be 500 lb. per sq. in. when cast-iron headers or elements are used and two and one-half times the working pressure when malleable iron is used, although the minimum test pressure with malleable-iron headers or elements shall be 500 lb. per sq. in.

PAR. 266 REVISED:

266 A vertical fire-tube boiler, except boilers of steam fire engines or boilers 24 in. or less in diameter, shall have not less than seven handholes, located as follows: Three in the shell at or about the line of the crown sheet; one in the shell at or about the water line or opposite the fusible plug when used; three in the shell at the lower part of the waterleg. A vertical fire-tube boiler, submerged-tube type, shall have two or more handholes in the shell, in line with the upper tube sheet. All boilers 24 in. or less in diameter shall have at least one opening for inspection and two openings in addition to the blow-off for washing out the boiler, these openings to be fitted with brass plugs.

PAR. 269 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, AND APRIL, 1923, ISSUES OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

269 *Safety Valve Requirements.* Each boiler having more than either 500 sq. ft. of water-heating surface or in which the generating capacity exceeds 2000 lb. per hour, shall have two or more safety valves. The method of computing the steam generating capacity of the boiler shall be as given in Par. 420 of the Appendix.

PAR. 272 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

272 All safety valves shall be so constructed that no shocks detrimental to the valve or to the boiler are produced and so that no failure of any part can obstruct the free and full discharge of steam from the valve. Safety valves may be of the direct spring-loaded pop type, with seat and bearing surface of the disk inclined at any angle between 45 deg. and 90 deg. inclusive, to the center line of the spindle. The maximum rated capacity of a safety valve shall be determined at a pressure 3 per cent in excess of that at which the valve is set to blow and with a blow down of not more than 4 per cent of the set pressure, the blow down to be in no case less than 2 lb.

Safety valves may be used which give any opening up to the full discharge capacity of the area of the opening of the inlet of the valve (see Par. 273*b*), provided the movement of the valve is such as not to induce lifting of water in the boiler.

Dead-weight or weighted-lever safety valves shall not be used.

PAR. 273 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, AND APRIL, 1923, ISSUES OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

273 Each safety valve $\frac{1}{2}$-in. size and larger shall be plainly marked by the manufacturer in such a way that the markings will not be obliterated in service. The markings may be stamped or cast on the casing, or stamped or cast on a plate or plates securely fastened to the casing, and shall contain the following:

a The name or identifying trademark of the manufacturer
b Size—The pipe size of valve inlet
(Where the valve inlet is not threaded, the initial diameter of the inlet shall be not less than the inside diameter of a standard pipe of the same nominal diameter as that of the valve)
c Pres.—The steam pressure at which it is set to blow
d B.D.—Blow down
(difference between the opening and closing pressures)
e Cap.—The weight of steam discharged in pounds per hour (at a pressure 3 per cent higher than that for which the valve is set to blow, and with the valve adjusted for the blow down given in preceding item)
f A.S.M.E. Std.

PAR. 277 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

277 The safety valve or valves shall be connected to the boiler independent of any other steam connection, and attached as close as possible to the boiler, without any unnecessary intervening pipe or fitting. Such intervening pipe or fitting, if used, shall not be longer than the face to face dimension (A-A) of the American Extra-Heavy Iron Flanged Tee Fitting of corresponding size shown in Table 17 and Fig. 33. Every safety valve shall be connected so as to stand in an upright position, with spindle vertical, when possible.

PAR. 278 REVISE PARAGRAPH AS PRINTED IN APRIL, 1923, AND MAY, 1923, ISSUES OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

278 The opening or connection between the boiler and the safety valve shall have at least the area of the valve inlet. In the case of fire-tube boilers, the openings in the boilers for safety valves shall be not less than given in Table 15 for capacities determined in accordance with Par. 274. No valve of any description shall be placed between the required safety valve or valves and the boiler, nor on the discharge pipe between the safety valve and the atmosphere. When a discharge pipe is used, the cross-sectional area shall be not less than the full area of the valve outlet or of the total of the areas of the valve outlets discharging thereinto, and shall be as short and straight as possible and so arranged as to avoid undue stresses on the valve or valves.

All safety-valve discharges shall be so located or piped as to be carried clear from running boards or platforms. Ample provision for gravity drain shall be made in the discharge pipe, at or near each safety valve, and where water of condensation may collect. Each valve shall have an open gravity drain through the casing below the level of the valve seat. For iron- and steel-bodied valves exceeding 2-in. size, the drain holes shall be tapped.

PAR. 279 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

279 If a muffler is used on a safety valve it shall have sufficient

TABLE 15 MINIMUM SIZE OF BOILER OUTLETS FOR SAFETY VALVES FROM FIRE-TUBE BOILERS FOR VARIOUS DISCHARGE CAPACITIES

Gage pressure, lb. per sq. in.	Size of Boiler Outlet for Safety-Valve Connections														
	Nominal Pipe Size and Actual Diameters of Pipe Sizes, In.														
	½ 0.622	¾ 0.824	1 1.049	1¼ 1.380	1½ 1.610	2 2.067	2½ 2.469	3 3.068	3½ 3.548	4 4.026	4½ 4.506	5 5.047	6 6.065	7 7.023	8 7.981
	Lb. of Steam per Outlet per Hour														
15	49	74	131	163	245	391	486	782	1026	1303	1613	2052	2916	3909	5212
25	66	99	174	218	326	523	653	1046	1372	1742	2156	2744	3898	5226	6968
50	107	161	284	354	532	851	1064	1703	2235	2839	3513	4470	6352	8517	11356
75	148	198	393	492	738	1181	1475	2361	3099	3935	4870	6198	8805	11805	...
100	189	285	503	629	944	1510	1877	3019	3963	5032	6227	7926	11259	...	...
125	230	346	613	767	1149	1836	2299	3677	4826	6128	7583	9652	13711	...	...
150	272	408	723	904	1355	2158	2710	4335	5690	7226	8940	11380	...	...	...
175	313	470	835	1040	1561	2497	3121	4993	6553	8320	10298	13106	...	...	...
200	354	533	941	1178	1766	2826	3532	5651	7418	9420	11655	14836	...	...	...
225	395	593	1052	1315	1972	3154	3944	6310	8280	10514	13013	...	...	...	...
250	437	656	1161	1451	2177	3484	4355	6968	9143	11614	14366	...	...	...	...

outlet area to prevent back pressure from interfering with the proper operation and discharge capacity of the valve. The muffler plates or other devices shall be so constructed as to avoid any possibility of restriction of the steam passages due to deposit.

PAR. 280 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, AND APRIL, 1923, ISSUES OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

280 When a boiler is fitted with two or more safety valves on one connection, this connection to the boiler shall have a cross-sectional area not less than the combined areas of inlet connections of all of the safety valves with which it connects and shall also meet the requirements of Par. 278.

PAR. 281 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, AND APRIL, 1923, ISSUES OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

281 Safetey valves shall operate without chattering and shall be set and adjusted as follows: To close after blowing down not more than 4 per cent of the set pressure but not less than 2 lb. in any case. For safety valves operating on pressures up to and including 300 lb. the blow down shall not be less than 2 per cent of the set pressure. To insure the guaranteed capacity and satisfactory operation, the blow down as marked upon the valve (Par. 273*d*) shall not be reduced.

PAR. 282 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

282 To insure the valve being free, each safety valve on boilers with maximum allowable working pressures up to and including 200 lb. per sq. in., shall have a substantial lifting device by which the valve disk may be positively lifted from its seat at least $^1/_{16}$ in. when there is no pressure on the boiler. For boilers with working pressures above 200 lb. per sq. in., the safety-valve lifting device need provide for lifting the valve disk $^1/_{16}$ in. only at such times as there is at least 75 per cent of the full working pressure upon the boiler. Except at times of general inspection, the valve should not be lifted, unless there is sufficient steam pressure on the boiler to blow the dirt and scale clean from the seat.

PAR. 283 REVISED:

283 The seats and disks of safety valves shall be of suitable material to resist corrosion. The seat of a safety valve shall be fastened to the body of the valve in such a way that there is no possibility of the seat lifting.

PAR. 286 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

286 A safety valve over 3 in. size, used for pressures greater than 15 lb. per sq. in. gage, shall have a flanged inlet connection. The dimensions of flanges subjected to boiler pressure not exceeding 250 lb. shall conform to the American Extra-Heavy Standard given in Table 17 of the Appendix, except that the face of the safety valve flange and the nozzle to which it is attached may be flat and without the raised face.

PAR. 289 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, AND APRIL, 1923, ISSUES OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

289 Every safety valve used on a superheater, discharging superheated steam, shall have a casing, including the base, body, bonnet and spindle, of steel, steel alloy, or equivalent heat-resisting material (see Par. 12). The valve shall have a flanged inlet connection, and shall have the seat and disk of nickel composition or equivalent material, and the spring fully exposed outside of the valve casing so that it shall be protected from contact with the escaping steam.

PAR. 290 REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

290 Every boiler shall have proper outlet connections for the required safety valve or valves independent of any other outside steam connection, the area of opening to be at least equal to the aggregate areas of inlet connections of all of the safety valves to be attached thereto. An internal collecting pipe, splash plate, or pan may be used, provided the total area for inlet of steam thereto is not less than twice the aggregate area of the inlet connections of the attached safety valves. The holes in such collecting pipes shall be at least $^1/_4$ in. in diameter and the least dimension in any other form of opening for inlet of steam shall be $^1/_4$ in.

PAR. 291 REVISED:

291 *Water Glasses and Gage Cocks.* Each boiler shall have at least one watergage glass, the lowest visible part of which shall be not less than 2 in. above the lowest permissible water level. The lowest permissible water level shall be that at which there will be no danger of overheating any part of the boiler when it is operated with the water not lower than that level.

PAR. 308 REVISE PARAGRAPH AS PRINTED IN JULY, 1922, AND JUNE, 1923, ISSUES OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

308 Each boiler shall have a bottom blow-off pipe, fitted with a valve or cock, in direct connection with the lowest water space practicable; the minimum size of pipe and fittings shall be 1 in. and the maximum size shall be $2^1/_2$ in. Straightway globe valves of the ordinary type as shown in Fig. $22^1/_2$, or valves of such type that dams or pockets can exist for the collection of sediment, shall not be used on such connections. Return connections of the same size or larger than the size herein specified may be used, and to which the blow-off may be connected. In such case, the blow-off must be so located that the connection may be completely drained.

PAR. 311*a* REVISE PARAGRAPH AS PRINTED IN DECEMBER, 1922, ISSUE OF MECHANICAL ENGINEERING TO READ AS FOLLOWS:

311*a* On all boilers except those used for traction and portable purposes, when the maximum allowable working pressure exceeds 125 lb. per sq. in., each bottom blow-off pipe shall have two slow-opening valves, or one slow-opening valve and a cock, and such valves, or valve and cock, shall be of extra heavy construction. On a boiler having multiple blow-off pipes, a single master valve may be placed on the common blow-off pipe from the boiler, in which case only one valve on each individual blow-off is required. Two independent valves or a valve and a cock may be combined in one body provided the combined fitting is the equivalent of two independent valves or a valve and a cock so that the failure of one to operate could not affect the operation of the other.

PAR. 430 REVISED:

430 Each boiler may have one or more fusible plugs, located at the lowest permissible water level as follows:

a In Horizontal-Return-Tubular Boilers—in the rear head, not less than 2 in. above the upper row of tubes, the measurement to be taken from the line of upper surface of tubes to the center of the plug, and projecting through the sheet not less than 1 in. When the distance between the uppermost line of tubes and the top of the steam space is 13 in. or less, the bottom of the fusible plug may come at a lesser distance than 2 in. above the upper row of tubes, but in no case shall the plug be located below the level of the top of the uppermost row of tubes.

r In Economic-Type Boilers—in the rear head not less than 2 in. above the upper row of tubes. When the distance between the uppermost line of tubes and the top of the steam space is 13 in. or less, the bottom of the fusible plug may come at a lesser distance than 2 in. above the upper row of tubes, but in no case shall the plug be located below the level of the top of the uppermost row of tubes.

s This section is to be omitted.

v For other types and new designs, fusible plugs shall be placed at the lowest permissible water level, subject to the direct radiant heat of the fire or in the direct path of the products of combustion, as near the primary combustion chamber as possible.

MANUFACTURERS' DATA REPORT REVISE ITEMS 5 AND 6 AS FOLLOWS:

5. Heating Surface.....sq. ft.	Built for maximum allowable work. pressure..... (Use S.F. of 5).....lb.
Hydrostatic test applied?.....lb.	Has material been checked with mill test reports?.....

6. Material for Shell, Straps, Heads and Furnace Sheets.....
(List all plates in this order below)

Plates for Shell, Head, etc.	Stamped Class (Firebox or Flange)	Manufactured by	Thickness In.	Stamped T.S. lb. per sq. in.	Mfrs. Test Identification No.

Yield Point lb. per sq. in.	Actual T.S. lb. per sq. in.	Elongation per cent, in 8 in.	C	Mn	P	S

FOLLOWING NEW ITEM TO BE INSERTED:

Diagonal and Gusset Stays .....
Length of Diagonal Stay (See Fig. 17) Length of line drawn at right angles to boiler head (See Fig. 17).

RULES FOR PIPE, PIPE MATERIAL AND FITTINGS USED ON STEAM BOILERS

(Published in October, 1922, issue of MECHANICAL ENGINEERING)

X-2 REVISED:

X-2 Steam Pipe. Pipes carrying saturated or superheated steam may be of welded or seamless pipe made of wrought iron or steel. For sizes above 3 in. in diameter the steel pipe shall be of open-hearth steel. All pipes shall be straight and free from blisters, cracks, laminations and other injurious defects. Liquor marks and lap-seam lines incidental to the manufacture of pipe will not be considered defects. Each length of pipe is to be inspected separately for defects on the inside and outside, noting particularly the character of the cross-section when cutting off crop ends. Pipe up to 3 in. in diameter may be butt-welded or lap-welded while that above 3 in. in diameter shall be lap-welded. Pipe material shall correspond with that required by the specifications of wrought-iron and steel pipe included in Par. *X-9*, et seq.

X-3 REVISED:

X-3 Thickness of Steam Pipe. In determining the thickness to be used for pipes at different pressures and for temperatures not exceeding 700 deg. fahr., the following formulas are to be used:

For pipes having nominal diameters of from 1/4 in. to 5 in.,

$$P = \frac{2S}{D}(t - 0.065) - 125$$

For pipes of nominal diameter over 5 in.,

$$P = \frac{2S}{D}(t - 0.1)$$

where

P = working pressure in lb. per sq. in. above atmosphere
t = thickness of wall of pipe in inches
D = outside diameter of pipe in inches
S = 9000 lb. per sq. in. for seamless steel pipe
= 7000 lb. per sq. in. for lap-welded steel pipe
= 5000 lb. per sq. in. for butt-welded steel pipe
= 5300 lb. per sq. in. for lap-welded wrought iron
= 4500 lb. per sq. in. for butt-welded wrought iron
= 4500 lb. per sq. in. for brass pipe
= 4000 lb. per sq. in. for copper pipe.

When the temperature of the steam exceeds 700 deg. fahr., the allowable stress should be reduced.

X-4 REVISED:

X-4 Feed Lines. High-pressure hot-water and cold-water lines may be made of welded or seamless pipe of wrought iron or steel as called for under Par. *X-2*. Where the water contains corrosive material or air, brass or copper tubing may be used. The allowable pressure for feed and water pipes shall be taken as 80 per cent of that for steam pipes of the corresponding sizes.

Where brass pipe is desired for finish or for any other reason it may be used. The brass and copper pipes used shall correspond to the specifications given under Pars. —— and the brass pipe shall be half-annealed in order to leave it in proper condition for use in feedwater piping.

X-5 REVISED:

X-5 Blow-off Piping. Blow-off pipe is to be as heavy as required for the feed pipe, and in any case at least as heavy as extra strong size. It shall be either wrought iron or steel. Where it is desirable for reasons of corrosion, brass or copper tubing may be used.

X-6 REVISED:

X-6 Pipe Bends. Pipes when bent may be made of steel or wrought iron and after bending are to be free from buckles and blisters and practically circular in cross-section. They are to be bent before being threaded or flanged, and where flanged they are to be refaced to dimensions so that they may be bolted or faced without forcing. Where the tangent length or the method of manufacture is such that the bend can be made without injury or distortion of the threaded ends of pipes or flanges, these may be bent after threading or flanging. Where possible, the tangent length of pipe at the end of each bend should be of a length equal to at least twice the nominal diameter of the pipe, although tangents may be used with lengths which are equal to the nominal diameter of the pipe. The advisable radius measured on the center line of the pipe, to which pipe should be bent, should be five or six times the nominal diameter of the pipe, although pipe may be bent to a radius equal to four times the diameter of standard pipe and three and one half times the diameter for extra strong pipe up to 12 in. Where special devices are used for bending pipes into coils, smaller radii than those recommended above may be used. The thickness of the pipe is to be determined by the formula given in Par. *X-3*. The boiler-feed-line bends are to conform with the above, while for blow-off lines the rules are to be applied to extra strong pipe.

X-7 to *X-20* CHANGE TITLE OF SPECIFICATION TO READ AS FOLLOWS:
SPECIFICATIONS FOR STEEL PIPE

X-21 to *X-36* CHANGE TITLE OF SPECIFICATION TO READ AS FOLLOWS:
SPECIFICATIONS FOR WROUGHT-IRON PIPE

X-9 REVISED:

X-9 Open-hearth steel shall conform to the following requirements as to chemical composition

	Lap-Welded	Seamless
Phosphorus....	not over 0.06 per cent	not over 0.005 per cent

X-11 REVISED:

a Pipe shall be tested at the mill to the hydrostatic pressures specified in Table 1.

CHANGE TITLE OF TABLE 1 TO READ:

TABLE 1 HYDROSTATIC PRESSURES FOR WELDED AND SEAMLESS STEEL PIPE

CHANGE HEADINGS OF THE FOURTH AND SEVENTH COLUMNS OF THE TABLE TO READ:

LAP WELDED AND SEAMLESS

DELETE WORDS "BLACK AND GALVANIZED" IN PARENTHESIS UNDER TABLE 1.

CHANGE FOOTNOTE OF TABLE 1 TO READ:

For pipes over 12 in. in inside diameter the test pressures should be calculated by the formula; $P = 2St/D$, in which P = pressure in pounds per square inch; S = fiber stress, 12,000 lb. per sq. in. for lap-welded pipe and 16,000 lb. per sq. in. for seamless pipe; t = thickness of wall in inches; D = inside diameter in inches.

MATERIAL SPECIFICATIONS

(Published in June, 1923, issue of MECHANICAL ENGINEERING)

S-8 REVISED:

S-8 Check Analyses. As a substitute for check analyses in the general rules, the purchaser may make an analysis from a

broken tension-test specimen representing each plate as rolled. The chemical composition thus determined shall conform to the requirements.

S-29 REVISED:

S-29 Permissible Tolerances. The diameter of the finished rivets measured cold shall not vary from that specified more than the amounts given in the following table:

Diameters in Inches	Variations in Diameter: Snap Gage Measurement	Variations in Diameter: Ring Gage Measurement
Up to 1/2, inclusive	Under 0.022	Over 0.020
Over 1/2 to 1, inclusive	Under 0.025	Over 0.030
Over 1 to 1 1/4, inclusive	Under 0.027	Over 0.035
Over 1 1/4 to 1 1/2, inclusive	Under 0.030	Over 0.040
Over 1 1/2 to 2, inclusive	Under 0.037	Over 0.040

Snap-gage measurement shall be made at point of minimum diameter but it is not required that the rivet shall turn completely in the gage. Measurement of the maximum tolerance shall be made with a ring gage, all rivets to slip full to the head in the gage of the required size for the various diameters.

The dimensions of the rivet head shall not vary from that specified more than the amounts given in the following table:

Diameter of Rivet	Head Tolerance: Width	Head Tolerance: Height
1/2	+ 1/16 − 1/32	+ 1/32
9/16	+ 1/16 − 1/32	+ 1/32
5/8	+ 1/16 − 1/32	+ 1/32
11/16	+ 1/16 − 1/32	+ 1/32
3/4	+ 5/64 − 1/32	+ 1/32
7/8	+ 5/64 − 1/32	+ 1/32
1	+ 5/64 − 1/32	+ 1/32

REVISE SPECIFICATIONS FOR STEEL STAYBOLTS AS FOLLOWS:

S-30 Solid or Hollow Staybolts. a Steel for solid or hollow bars for staybolts shall conform to the requirements for boiler rivet steel, except as follows:

b Tension Tests. The bars shall conform to the following requirements as to tensile properties:

Tensile strength lb. per sq. in., maximum	60,000
Yield point min., lb. per sq. in	26,000
Elongation in 8 in., min., per cent	1,500,000 / Tens. Str.

c Permissible Variation in Gage. Solid or hollow bars for staybolts, not exceeding 1 1/4 in. diameter which are to be threaded as rolled, shall be truly round within 0.01 in. and shall not vary more than 0.005 in. under or more than 0.01 in. over. All other bars for staybolts shall conform to the specified tolerances for steel bars.

S-31 Seamless Tubing for Staybolts. Seamless steel tubing for threaded steel staybolts shall conform to the following requirements. This specification will not apply to stay tubes for locomotive boilers.

S-32 Chemical Composition. The steel shall conform to the following requirements as to chemical composition:

Manganese	0.30 to 0.60
Phosphorus	not over 0.04
Sulphur	not over 0.045

S-33 Check Analysis a. Analysis of two tubes in each lot of 250 tubes or less, may be made by the purchaser. The chemical compositions thus determined shall conform to the requirements specified. Drilling for analysis shall be taken from general points around each tube.

b If the analysis of one tube does not conform to the requirements specified, analysis of two additional tubes from the same lot shall be made, each of which shall conform to the requirements specified.

S-34 Tension Tests. The tubes shall conform to the following requirements as to tensile properties:

Tensile strength lb. per sq. in., maximum	60,000
Yield point, min., lb. per sq. in	25,000
Elongation in 8 in., min., per cent	1,500,000 / Tens. Str.

S-35 Test Specimens. Test specimens shall consist of either full-section specimens or of sections cut longitudinally from a tube.

S-36 Number of Tests. a Two tension tests from each 2500 ft. of tubing shall be made, or in case the tubing from separate melts can be identified two tension tests shall be made from each melt.

b If the results of the physical tests of one specimen from any lot do not conform to the requirements specified, two additional specimens from the same lot may be tested each of which shall conform to the requirements specified.

c If any test specimen develops flaws, it may be discarded and another specimen substituted.

d If the percentage of elongation of any tension-test specimen is less than that specified, and any part of the fracture is outside the middle third of the gage length, as indicated by scribe scratches marked on the specimen before testing a retest shall be allowed.

S-37 Fracture Test. A special fracture test shall be made from each 2500 ft. of tubing by cutting partly through the wall of the tube and breaking it off when removing the crop end. The fracture thus produced shall be fine-grained.

S-38 Permissible Variation in Gage. The finished tubing shall be circular within 0.015 in., and the outside diameter shall not vary more than 0.01 in. over or under the size specified.

S-54 to *S-65* CHANGE TITLE OF SPECIFICATION TO READ AS FOLLOWS:

SPECIFICATIONS FOR BOILER RIVET, STAYBOLT, AND EXTRA-REFINED BAR IRON

REVISE SPECIFICATION TO READ AS FOLLOWS:

S-54 Process. Rivet and staybolt iron shall be rolled from a bloom, slab pile, or box pile made wholly from reworked all-pig puddled iron or reworked knobbled charcoal iron. The puddle mixture and the component parts of the bloom, slab pile, or box pile shall be free from any admixture of iron scrap or steel. Staybolt iron shall be double-worked; that is, twice piled.

Extra refined bar iron shall be made wholly from all-pig puddled iron and shall be free from any admixture of iron scrap or steel.

S-55 Physical Properties and Tests. The iron shall conform to the following requirements as to tensile properties:

	Rivet Iron	Staybolt Iron	Extra Refined Bar Iron
Tensile strength, lb. per sq. in.	48000–52000	48000–52000	48000–54000
Yield point, min., lb. per sq. in.:			
1 1/4 sq. in. and under in sectional area	0.6 ten. str.	0.6 ten. str.	0.6 ten. str.
Over 1 1/4 sq. in. to 4 sq. in., incl., in sectional area	0.55 ten. str.	0.55 ten. str.	0.55 ten. str.
Elongation in 8 in., min., per cent	28	30	29
Reduction of area, min., per cent	45	48	37

S-56 Cold-Bend Tests. Rivet Iron. a The test specimen shall withstand being bent cold through 180 deg. flat on itself, without fracture on the outside of the bent portion.

Staybolt Iron. b The test specimen shall withstand being bent cold through 180 deg. flat on itself in both directions, without fracture on the outside of the bent portions.

Extra Refined Bar Iron. c The bend test specimen shall withstand being bent cold through 180 deg. without fracture on the outside of the bent portion, around a pin the diameter of which is equal to the diameter or thickness of the specimen.

S-57 Hot-Bend Test. Extra Refined Bar Iron. The test specimen when heated to a temperature between 1700 and 1800 deg. fahr. shall withstand being bent through 180 deg. flat on itself without fracture on the outside of the bent portion.

S-58 Nick-Bend Tests. The test specimen when nicked 25 per cent around for round bars, and along one side for flat bars, with a tool having a 60 deg. cutting edge, to a depth of not less than 8 per cent or more than 16 per cent of the diameter or thickness of the specimen, and broken, shall show a wholly fibrous fracture.

S-59. Bend tests may be made by pressure or by blows.

S-60 Etch Tests. The cross-section of the test specimen shall be ground or polished, and etched for a sufficient period to develop the structure. For rivet and staybolt iron this test shall show the material to have been rolled from a bloom, slab pile, or box pile and to be uniform and free from steel. For extra refined bar iron the structure shall be uniform and free from steel.

S-61 Test Specimens. Test specimens shall be of the full section of material as rolled.

S-62 Number of Tests. a All bars of a given grade and size shall be piled separately, sorted in lots of 100 each. Two bars shall be selected at random from each lot or fraction thereof and tested as specified; but only one of these bars shall be etch-tested.

b If any test specimen from bars originally selected to represent

a lot of material contains surface defects not visible before testing but visible after testing, or if a tension-test specimen breaks outside the middle third of the gage length, the individual bar shall be rejected and one re-test from a different bar will be allowed.

S-63 Permissible Variations in Gage. *a* Iron bars for staybolts, not exceeding 1¼ in. diameter, which are to be threaded as rolled, shall be truly round within 0.01 in. and shall not vary more than 0.01 in. above nor more than 0.005 in. below the specified size. All other iron bars for staybolts shall conform to the specified tolerances for extra refined bar iron and rivet iron.

b For rivet iron and extra refined bar iron the bars shall conform to the standard limit gages as given in Table 1.

TABLE 1 TOLERANCES FOR RIVET IRON AND EXTRA REFINED BAR IRON

Nominal Diameter of Bars, in.	Large Size, + End, in.	Small Size — End, in.	Total Variation, in.
¼	0.2550	0.2450	0.010
5/16	0.3180	0.3070	0.011
⅜	0.3810	0.3690	0.012
7/16	0.4440	0.4310	0.013
½	0.5070	0.4930	0.014
9/16	0.5700	0.5550	0.015
⅝	0.6330	0.6170	0.016
11/16	0.7585	0.7415	0.017
¾	0.8840	0.8660	0.018
1	1.0095	0.9905	0.019
1 1/16	1.1350	1.1150	0.020
1 ⅛	1.2605	1.2395	0.021
1 3/16	1.3860	1.3640	0.022
1 ¼	1.5115	1.4885	0.023
1 5/16	1.6370	1.6130	0.024
1 ⅜	1.7625	1.7375	0.025
1 7/16	1.8880	1.8620	0.026

Round bars 2 in. in diameter and over shall be rolled to nominal diameter.

c The widths or thicknesses of flat bars shall not vary more than two per cent from that specified.

S-64 Finish. The bars shall be smoothly rolled and free from slivers, depressions, crop ends, seams and evidences of being burnt.

S-65 Marking. The bars shall be stamped or otherwise marked as designated by the purchaser.

SPECIFICATIONS FOR COPPER BARS FOR STAYBOLTS

Revise percentage of elongation required for arsenical copper from 35 to 40.

SPECIFICATIONS FOR COPPER PIPE

New specification to be added based upon A.S.T.M. Specifications B42–23.

SPECIFICATIONS FOR BRASS PIPE

New specification to be added based upon A.S.T.M. Specifications B43–23.

A.S.M.E. Boiler Code Committee Work

THE Boiler Code Committee meets monthly for the purpose of considering communications relative to the Boiler Code. Any one desiring information as to the application of the Code is requested to communicate with the Secretary of the Committee, Mr. C. W. Obert, 29 West 39th St., New York, N. Y.

The procedure of the Committee in handling the cases is as follows: All inquiries must be in written form before they are accepted for consideration. Copies are sent by the Secretary of the Committee to all of the members of the Committee. The interpretation, in the form of a reply, is then prepared by the Committee and passed upon at a regular meeting of the Committee. This interpretation is later submitted to the Council of the Society for approval, after which it is issued to the inquirer and simultaneously published in MECHANICAL ENGINEERING.

Below are given the interpretations of the Committee in Cases Nos. 419, 423 to 430 inclusive, as formulated at the meeting of September 27, 1923, and approved by the Council.

In accordance with the Committee's practice, the names of inquirers have been omitted.

CASE NO. 419

Inquiry: Is it permissible, under the requirements of the Code, to electrically weld the calking edges of plates instead of the usual method of mechanical calking?

Reply: In the opinion of the Boiler Code Committee, Par. 257 of the Code is mandatory in its requirement for mechanical calking. The use of electrical welding as a substitute for the usual method of mechanical calking is therefore not permissible.

CASE NO. 423

(In the hands of the Committee)

CASE NO. 424

Inquiry: Is it permissible, under Par. L-5 of the Code for Boilers of Locomotives to use dome caps of cast iron providing the cap is of sufficient thickness to safely withstand the required pressure calculated according to recognized formulas for such construction?

Reply: There is no provision in the Rules for Boilers of Locomotives for the use of cast iron other than is specified in Par. L-9 and it is the opinion of the Committee that this material is not suitable for the construction of dome caps.

CASE NO. 425

Inquiry: Is it permissible, under the requirements of the Boiler Code for circular furnaces, to use instead of the Adamson ring a grooved ring formed from steel plate, of thickness not less than the thickness of the furnace sheet and the U-shaped groove formed not less than 4 in. high outside and 3 in. wide inside, so as to better provide for expansion and contraction, and if so how shall it be calculated?

Reply: It is the opinion of the Committee that there is nothing in the Rules of the Boiler Code to prevent the use of the form of reinforcing ring described, but in such case the maximum allowable working pressure shall be calculated from the formula in Par. 242 for the Adamson type of furnace.

CASE NO. 426

(In the hands of the Committee)

CASE NO. 427

Inquiry: If rivet holes are drilled in an incorrect position in the shell of a boiler for a brace or for a supporting lug, and the mistaken holes are at least 6 in. from the nearest hole where the brace or lug should be applied, is it permissible to plug the incorrect holes with rivets?

Reply: There is no rule in the Code to cover the case referred to, but it is this opinion of the Committee that if the location of the mistaken holes is not such as to lower the required factor of safety for the boiler shell, there will be no objection to plugging them by rivets, provided they conform to the requirement of Par. 255 of the Boiler Code.

CASE NO. 428

(In the hands of the Committee)

CASE NO. 429

(In the hands of the Committee)

CASE NO. 430

Inquiry: Is it permissible, under the rules in the boiler code to insert in the blow-off pipe from a boiler, two "quarter-turn valves," each of a type formed with a taper plug operated through a cam mechanism that holds the plug firmly in its seat, yet allows it to turn freely, whereas Par. 311*a* of the Code requires two valves or a valve and a cock in such blow-off pipe?

Reply: It is the opinion of the Committee that a valve of the construction referred to employing a plug which can open the passage through the body from closed position to full open position by one-quarter turn of the plug on its axis, will come within the classification of a "cock" specified in Par. 309, and that it was the intent in Par. 311*a* that a slow-opening blow-off valve be used in connection with such a cock.

MECHANICAL ENGINEERING

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Measurements in Ordnance Work

COLONEL Tschappet's paper, the leading article of this issue of MECHANICAL ENGINEERING, deals with devices for measuring pressures and velocities of an extremely high order. Such instruments are essential if the performance of a gun is to be taken from the realm of conjecture and transferred to a more certain base of knowledge, and it is to be noted that the increased power and range of modern ordnance render the measuring problem doubly difficult. The pressures and velocities encountered in ordnance work may be employed in the future in industrial work. The Claude ammonia process, for example, operates under 1000 atmospheres pressure and a temperature of 650 deg. cent., so the day may not be far off when ordnance measuring devices may be borrowed, in principle at least, by the engineer in industry.

Engineering Education

TWO recent announcements relating to engineering education indicate that advances in that field are likely in the near future. The first is the appropriation by the Carnegie Corporation of one hundred and eight thousand dollars for research in engineering education, to be expended under the guidance of the Society for the Promotion of Engineering Education. The second is the issuance of the report of the National Industrial Conference Board on engineering education and American industry. This report points out that the increase in the use of machinery, power, and labor-saving devices, and in the elaboration of methods of control in production and distribution, increases the demand for experts and leaders with engineering and administrative training. To provide these men, the report calls for adequate training in and knowledge of fundamentals, and what is more important, a training in the power to use this knowledge in effective thought and action. The fundamentals of engineering training are stated as mathematics, the important principles of physics, chemistry, etc., principles of economics, principles that govern relations between people, history of nations, and the art of clear and correct expression in speaking, writing, and drawing.

In recent years engineering educators have often been urged to train specialists for the various industries. The findings of this report, sponsored by an industrial group, calling for men trained in fundamentals should offset the requests for specialists. The education of engineers in the fundamentals should make for a broader profession.

The problem of engineering education, however, is not so much to discover what to teach, but to maintain the high-grade teaching staffs that such education demands.

A.S.M.E. Annual Meeting and Power Exposition

THE leading places on the program for the A.S.M.E. Annual Meeting will be assigned to the topics of Reforestation and Timber Conservation, and The Fundamentals of Hydroelectric Power Development. The dates for the meeting are December 3 through 6. The two leading sessions will be held on Wednesday, December 5. In the afternoon of that day John W. Blodgett, President of the National Lumber Manufacturers' Association, will emphasize the importance of a national policy for reforestation. He will also point out the economies in lumber utilization that may be realized by a standardization program. On Wednesday evening, John R. Freeman, Past-President of The American Society of Civil Engineers and The American Society of Mechanical Engineers, will outline the fundamentals that prevail in the successful development of hydroelectric power.

The Professional Divisions are cooperating in the preparation of the program which comprises seventeen technical sessions. The list of the events for the meeting is as follows:

December 3 (Monday), Morning and Afternoon: Council Meeting and Local Sections Conference.
Evening: Presidential Address, Award of Medals and Reception.

December 4 (Tuesday), Morning: Joint Session with A.S.R.E., Textile Session, General Session and Open Discussion of Fluid Meter Report.
Afternoon: Business Meeting and Public Hearing on Power Test Codes.
Evening: Smoker and Ladies' Bridge.

December 5 (Wednesday), Morning: Fuels Session, Railroad Session, Ordnance Session.
Afternoon: Reforestation Session, Steam Research Session and Ladies' Tea.
Evening: Session on Hydroelectric Development.

December 6 (Thursday), Morning: Power Session, Machine Shop Session and Aeronautic Session.
Afternoon: Management Session, Gas Power and Water Measurement Session.
Evening: Dinner Dance.

Visits to places of industrial and engineering interest will be scheduled during the meeting.

The National Exposition of Power and Mechanical Engineering will be held in Grand Central Palace from December 3 through 8, opening daily at noon. Over 250 exhibits of power-plant apparatus, materials-handling equipment and power-transmission devices will be displayed. There will also be a series of historical exhibits and a continuous program of motion pictures.

Last year was the first year of the Power Exposition and over 47,000 engineers, operating men, and laymen viewed the exhibits. This year the space occupied is much larger and the exhibits are more diversified.

World Power Conference, London June 30-July 12, 1924

SIXTEEN countries are to participate in the first World Power Conference, to be held at the British Empire Exhibition, Wembley, London, June 30 to July 12, 1924. The British National Committee has made the first announcement of the papers that will be presented under its auspices. Among the titles and authors are: Steam Generation, by Sir James Kemnal; Steam Turbines, by the Hon. Sir Charles Parsons; Mechanical and Hydraulic Variable Transmission of Power, by Dr. H. S. Hele-Shaw; Application of Power to Rail Transport, by Roger T. Smith and C. B. Collett; Application of Power to Road Transport, by Col. R. E. Crompton; International Standardization, by C. LeMaistre; The Education and Training of the Engineer of the Future, by A. P. M. Fleming; The Importance of Greater Public Interest in Mechanical Progress, by T. C. Elder; and The Study of the Human Element in Production, by D. R. Wilson. The American Committee contemplates presenting about thirty papers at the Conference.

A Transportation Committee has been appointed to make reservations and arrangements so that those attending the Conference may travel in a body. It is expected that the American party will aggregate some two or three hundred, participation not being confined to formally appointed delegates.

Any further information regarding the American Committee's plans may be obtained by addressing O. C. Merrill, General Chairman, at the Federal Power Commission, Washington, D. C.

$108,000 for Research in Engineering Education

THE Carnegie Corporation of New York has voted the sum of $108,000 for a study of engineering education under the direction of the Society for the Promotion of Engineering Education. Of this sum $24,000 is available during the present fiscal year.

This action of the Carnegie Corporation is a direct result of the work of the Board of Investigation and Coördination appointed by the Society for the Promotion of Engineering Education to conduct an active campaign for the promotion of engineering education in the light of future needs as they may be developed, to coördinate the engineering educational activities of the various agencies interested, and to conduct research into engineering education. This Board of Investigation and Coördination laid out the following plan to which the appropriation of the Carnegie Corporation is to be devoted:

The Society for the Promotion of Engineering Education purposes during the next three years to make a discriminating study of the present state of engineering education. It is proposed that the investigations be directed to a study of the objects of engineering education and the fitness of the present-day curriculum for preparing the student for his profession. It will study the process by which the curriculum of fifty years ago has come to its present form; it will seek to set forth the nature and the weakness of the curriculum as at present administered; and it will indicate such modifications or developments as would seem to make for a sound, well-balanced, and fruitful course of study for engineering students.

The following organization and program have been adopted for this investigation:

1 The inquiry shall be carried on under the general direction of a committee appointed by the society for the Promotion of Engineering Education, with the understanding that this committee shall include at least two men chosen from outside the society and the engineering profession, whose point of view will be primarily that of the trained teacher.

2 The active conduct of the study will be under the supervision of a Director appointed by the committee, whose office shall be in New York, and if possible, in the Engineering Building. The publication of the results of the study will be also in the hands of the Director.

3 The Director shall organize committees in the faculties of as large a number of engineering schools as may be practicable, who shall coöperate with the committee in the prosecution of this study.

4 Inasmuch as a study of the engineering curriculum of American schools should include a knowledge of, and comparison with, the best schools in Europe, it is considered necessary that the Director of the Committee shall, as soon as his work is organized, visit such engineering schools of European countries as may throw light upon the best methods in engineering education.

5 It is believed that the cost of this inquiry will amount to $24,000 the first year; $36,000 the second year; and $48,000 the third year, including the cost of publication.

The investigation is in the hands of the Board of Investigation and Coördination which is made up of Charles F. Scott, Chairman, Mortimer E. Cooley, J. H. Dunlap, D. C. Jackson, F. W. McNair, P. F. Walker, and F. L. Bishop, Secretary.

Secretary Hoover Favors Sectional Control of Interstate Power

AT THE CONFERENCE of representatives of the Public Service Commissions of ten northeastern states, held in New York, October 13, 1923, Secretary Hoover emphasized the importance of coördination between public authorities and industry to further the development of the superpower system in the northeast. Mr. Hoover repeated the findings of the Superpower Report which pointed out the conservation of fifty million tons of coal per annum and a saving of five hundred million dollars per annum to be obtained by coördinated electrical power systems. He pointed out that the project had advanced to the stage where methods of regulation could be taken up, and in discussing this, spoke in part as follows:

In the matter of public relations to power development and distribution it appears to me that one of the first principles we must realize is that the whole of this development implies the free flow of power. We have thus at once created at least a physical and economic interstate question. This great development of so much public interest cannot come about unless there is a complete liquidity in movement of power back and forth across the boundaries throughout the whole of the United States. We cannot secure centralized generation, great water-power development, or interconnection of load unless there is this free flow. Without this we shall have permanently a larger cost of power and less expansion in its service. There are time-honored disputes over states rights with regard to water, and somewhat similar questions are being raised as to power. Subject always to the sovereignty of states in taxation, etc., unless all citizens irrespective of state may have the same rights as to use of power, we will destroy the hopes of a very great economic development.

I am advised that it is probably true that no embargo could be constitutionally placed upon power flow across state frontiers, but uncoördinated legislative and regulative actions by the states and the National Government might amount to economic embargoes and discrimination and thus stifle development.

Again, my argument that we must have free interstate flow of power implies free flow within the states, and applies with the same strength to the complete necessity of statewide regulation uninterfered with by municipal obstruction.

The regulation of power distribution, profits, or rates is a concept fully fixed into our governmental system.

The economical distribution of power rests, to a large degree, upon local territorial monopoly. Competitive overlap of power distribution systems would represent tremendous capital and distribution waste. When we accept the principle of monopoly we at once must accept the principle of public regulation. This is a fundamental conception upon which there is no need for dispute or argument. It is amply accepted by universal state legislation. Our states have wisely created public-service commissions with state-wide regulatory power in order that rates, profits, and distribution might be controlled.

I am not here to advocate Federal superregulation of interstate movement of power. I believe that power development and distribution would find its greatest solution in coördinated state regulation, perhaps with assistance and coöperation of the Federal Government, rather than in any superstructure of authority such as has been found necessary in transportation, unless of course necessities of the case cannot be attained otherwise.

One phase of public relationship is involved in the great water-power development of the St. Lawrence. It is of vital importance as an enormous contribution to the whole northeastern states. The American share would amount to 1,200,000 horsepower producible at a cost far lower than any form of fuel generation. It is a pitiable waste today and can only be mobilized by coöperation of the Federal Government.

In any event, the problems we are here to discuss are from a public point of view that by virtue of these scientific developments power has now become an interstate question. If in our interstate conflicts or national policies we are hindering the development of progress of so fundamental a thing, it is but right that we should consider the subject in all of its aspects and seek to remedy it.

There is a phase of this whole public relationship that seems to me to be slowly emerging, and that is that the United States will naturally divide itself into several power areas. For instance, the barren area of power consumption formed by the Adirondacks on the east and the character of natural resources along Mason and Dixon's line on the south create a natural district in the New England and Mid-Atlantic states. Another power district lies to the west of the Alleghanies and east of the Mississippi River. Still another district lies in the southeastern states, again in the southwestern states, and still another in the northwestern states. The problems in each of these power districts are essentially different as to the origins of power and the character of their industries, and are affected by the rate of probable industrial development in some states. And if we are to make rightful solution of national problems we should consider their development as essentially separate questions.

Albert Reid Ledoux

DR. Albert Reid Ledoux, who died on October 25, was an international figure in the mining and metallurgical industry. Since 1880 he had conducted a practice as consulting engineer, metallurgist, and assayer, and his integrity and intelligence gave him an outstanding reputation.

His serenity and sanity made him a dependable leader in engineering-society work. He was at one time president of the American Institute of Mining and Metallurgical Engineers and was the first president of the United Engineering Society when the joint building for the engineering societies became a reality. His guidance during the formative period was an important factor in the successful launching of a project that has been of incalculable value to the entire engineering profession.

Steinmetz

IT IS FORTUNATE that Steinmetz lived in an age when his remarkable genius could be utilized to its fullest extent. Steinmetz himself was fortunate in that he approached the great scientific problems when he was in his prime and was enabled to see his theoretical solutions of the problems put to practical use, so that during his own lifetime he could view the magnitude of his achievements and realize their importance to mankind.

His incomparable ability for mathematical analysis found an avenue for utilization in investigations of magnetism, alternating currents, radiation, thermodynamics, and illumination, and his contributions made possible the present state of the art of generation and transmission of electrical power. It is difficult to see how any other man could have possibly accomplished what he did. Prof. Harris J. Ryan, President of the American Institute of Electrical Engineers, expresses it in the following words:

CHARLES PROTEUS STEINMETZ

> Through a period of years Dr. Steinmetz stood almost alone as the one electrical engineer in the world capable of defining and solving the many perplexing problems encountered for the understanding and improvement of the transformer, induction motor, alternator, and polyphase high-voltage system, the modern fundamental implements of the electrical engineer.

But in the story of Steinmetz there were many other things which contributed to the romantic tale of life and achievement. His orchids, his pet crows, his bicycle, his camp, his cooking, and his affection for his adopted sons are glimpses of a full and happy life. One paragraph in the introduction to his book on American and the New Epoch is especially revealing.

> When I landed at Castle Garden, from the steerage of a French liner, I had ten dollars and no job and could speak no English. Now, personally I have no fault to find with existing society; it has given me everything I wanted; I have been successful professionally, in engineering, and have every reason to be personally satisfied, and the only criticism which I can make is that I would far more enjoy my advantages if I knew that everybody else could enjoy the same.

Dr. Steinmetz, chief consulting engineer of the General Electric Company, died suddenly at his home in Schenectady, N. Y., October 26, from acute dilatation of the heart following chronic myocarditis, a weakening of the heart muscles, of many years' standing. He had returned from a trip to the Pacific Coast on October 13 and, an examination by his physician disclosing the fact that his heart action was unsteady, a complete rest was advised. But just as he was showing signs of improvement, he passed quietly away.

Charles Proteus Steinmetz, born April 9, 1865, in Breslau, Germany, was educated at the gymnasium (high school) and then at the University of Breslau, where he studied mathematics and astronomy, then physics and chemistry, and finally, for a short time, medicine and economics. Involved in the social democratic agitation against the government, he escaped to Switzerland in 1888, and there studied mechanical engineering at the Polytechnicum.

In 1889 he immigrated to America, and found a position with the Osterheld & Eickemeyer Manufacturing Company, first as draftsman, then as electrical engineer and designer, and finally in research work in charge of the Eickemeyer Laboratory, in New York.

With the absorption of the Eickemeyer-Field interests by the General Electric Company, Dr. Steinmetz joined the latter organization. Upon the transfer of the company's headquarters to Schenectady in the spring of 1894, Dr. Steinmetz organized and took charge of the calculation and design of the company's apparatus and of its research and development work.

For a number of years Dr. Steinmetz was professor of electrical engineering at Union College, and at the time of his demise was professor of electrophysics at Union University. During this period, however, he retained his connection with the General Electric Company as chief consulting engineer.

Dr. Steinmetz was past-president of the National Association of Corporation Schools, vice-president of the International Association of Municipal Electricians, past-president of the American Institute of Electrical Engineers, honorary member of the National Electric Light Association, past-president of the Illuminating Engineering Society, fellow of the American Association for the Advancement of Science, member of the (British) Institution of Electrical Engineers, member of The American Society of Mechanical Engineers, the Electrochemical Society, the Illuminating Engineering Society, the Physical Society, etc., etc. He had also served as president of the Common Council and twice as president of the Board of Education of the city of Schenectady.

A Search for Facts in Materials Handling

A CONFERENCE of the Materials Handling Division of the A.S.M.E. was held in the Engineering Societies Building on November 2 for the purpose of considering the future activities of the Division.

The formulas recently completed for computing the economies of labor-saving equipment were discussed and the value of such formulas to both the prospective user and the seller of equipment was emphasized. The report of the Formula Committee, which appeared in the September issue of MECHANICAL ENGINEERING, has attracted wide attention and is being brought into use to secure an accurate measure of economies that may be obtained by installing labor-saving equipment. Facts will be of tremendous importance in developing the science of materials handling, and the Conference gave some attention to a program of research in this field, which would concentrate at first on one activity, such as industrial trucking. The use of the formula in obtaining comparable costs is to be secured by sending copies of it to manufacturers and users of materials-handling equipment, and inviting them to a conference during the Annual Meeting of the Society in December.

New Boiler Code Regulations for India

THE various states of India have for several years been engaged in the formation of a uniform Indian code of boiler regulations, to replace the several different codes that were in effect. According to recent advices, the new code has been declared effective and is being published, so that a warning is due to American exporters who may have occasion to consider deliveries of boilers or boiler appurtenances into that country. Although it will be sometime before a copy of the new Indian code can be obtained, information has been received that the new regulations become effective on January 1, 1924. A member of the Society located in India has advised that the new regulations differ quite materially from those which have previously been in force in any part of India. It is the hope that information may soon be received to permit a comparison of the new regulations with the A.S.M.E. Boiler Code.

Southern Sections Hold Regional Meeting at Chattanooga

Noteworthy Gathering at Which the Subjects of Welding, Power and Fuel, and Management Were Discussed

THE first Southern Regional Meeting of The American Society of Mechanical Engineers, held in Chattanooga, Tenn., October 23 and 24, was noteworthy for its interesting program bearing on the industrial problems of the South. The attendance of about 150 was made up of engineers from Atlanta, Birmingham, Knoxville, Greenville, Memphis, Nashville, and Cincinnati. A group of twenty students from the University of Tennessee at Knoxville attended in a body under the leadership of Dean Ferris. The Council of the Society was represented by Walter S. Finlay, Jr., of New York, Earl F. Scott of Atlanta, Henry M. Norris of Cincinnati, and Secretary Calvin W. Rice.

Technical sessions devoted to the subjects of welding, power and fuel, and management were presided over by Hon. Newell Sanders, Ex-U. S. Senator. The opening session of the meeting was devoted to welding. The first paper was presented by Fred E. Rogers[1] who dealt with the subject of welding in locomotive repair shops. Mr. Rogers told of a recent survey of locomotive-shop practice which showed over one hundred welding operations practiced in locomotive repair work. The complete paper gives a list of the parts that have actually been repaired. In discussing them Mr. Rogers dwelt at some length on the possibilities of repairing locomotive frames, cylinders, piston rods, pistons, wheel centers, tires, and steel tender transoms, in each case pointing out the difficulties to be overcome in producing a successful weld. Mr. Rogers stressed the extreme importance of competent supervision of welding in the railway repair shop. In all too many places the welders lead a somewhat happy-go-lucky existence, deciding themselves to a large degree what can be and what cannot be done with the torch. The result is that sometimes hot, disagreeable jobs are "passed up" as being impracticable, and parts are scrapped that could be profitably repaired. Apparatus sometimes is not kept in first-class working order. Pressure gages are allowed to go in disrepair, hose is used in bad condition, and welding tips are thrown away when a slight defect develops that might be easily corrected. Such conditions are due largely to the fact that many shop foremen having had no personal experience in welding have vague ideas of sound practice. They necessarily depend on their welders to devise ways and means for doing their work, and if the verdict in a particular case is for or against, they feel that they must necessarily accept it. This condition is rapidly improving due, of course, to the awakened interest in welding and also to the valuable service rendered by industrial engineers employed by the large concerns promoting the sale and use of welding equipment and supplies. Copies of Mr. Rogers' complete paper are available on application to the Secretary of the A.S.M.E.

S. W. Miller[2] treated the subject of Fusion Welding of Pressure Vessels and Pipe Lines. He pointed out that while the advantages of welded joints in low cost and absolute tightness had attracted considerable attention, there had been little attention paid to proper methods of design because the physical constants of welds had not been well known and because it had been too frequently assumed that if a certain design were suitable for riveting, for example, it must be equally good for welding.

Mr. Miller then discussed some common errors in design and showed how these errors might be avoided. In order to design intelligently, he said, the strength of welds and welded pieces must be known. In designing a riveted joint the tensile and compressive strengths of the sheet and the shearing and compressive strength of the rivets must be known. Also, there was always assumed reasonably good workmanship, such as reamed rivet holes, suitable-sized rivets properly driven, and accurate fitting up of the plates. Further, for important work the plate and rivet materials were controlled by carefully drawn specifications. To insure proper compliance with the various requirements, it had been found necessary to have inspectors watch the materials and workmanship, and suitable tests of the finished structure must be made.

Mr. Miller could not see any difference between the general requirements for fusion-welded pressure vessels and for riveted tanks, and he believed that a knowledge of weld strength and peculiarities, the use of proper materials, good inspection of the workmanship, and suitable tests of the completed article would result in a product that would be perfectly safe and of undoubted value. His treatment of pipe welding was confined to the subject of the circumferential seams joining lengths of pipe. He pointed out the advantages of welded joints for oil pipe lines, water lines, and steam pipes. In conclusion he proposed a specification for welding pipe. Mr. Miller's paper will appear in a future issue of MECHANICAL ENGINEERING.

The final paper of the session was presented by R. D. Reed,[3] who spoke on Arc Welding. Mr. Reed told how arc welding had been developed for production operations and showed many lantern slides of products that had been successfully manufactured by the arc welding process.

The program for the session on power and fuel was made up of two papers. The first was by Professors J. A. Switzer and W. L. Woolrich, of the University of Tennessee, who spoke on the Water, Coal, and Man Power of the Western Slope of the Southern Appalachian Mountains. The authors pointed out the natural advantages in the Southern Appalachian District of an abundance of coal of high quality, the availability of condensing water at low temperature, and a population of Anglo-Saxon strain, all these in addition to abundant rainfall and the resulting hydroelectric power possibilities. A paper on the Use of Pulverized Coal in Open-Furnaces was given by R. H. Lowndes, chief engineer of the Atlantic Steel Co. of Atlanta, who showed that pulverized fuel was not as suitable or as economical for open-hearth furnaces as natural gas or producer gas. Furnace repairs were much higher for pulverized-fuel-fired furnaces than for gas furnaces. Both of these papers appeared in the November issue of MECHANICAL ENGINEERING.

The Chattanooga Management Session was one of the series held during Management Week. The first speaker, H. G. Bryan,[4] outlined the growth of the hosiery industry in the South. He pointed out the great advantage of the small southern towns for hosiery mills in that they afford a plentiful supply of the right kind of labor. The large mills in which are incorporated finishing and dyeing plants are located in the larger towns with small branch mills in surrounding small towns which knit the cheaper goods and send them in to be finished at the central plant. This placing of the mills in small towns is a constructive step toward a reduction of the congestion in the larger cities.

The paper on the Measurement of Management by Prof. Joseph W. Roe, of New York University, was also presented, as was a discussion on Ratios for the Measurement of Management by Daniel E. Knowles of Chicago. The discussion at this session was most spirited. The matter of ratios for the measurement of management as presented by Professor Roe and Mr. Knowles elicited many questions as to the simple and practical ways of securing proper ratios for the guidance of manufacturing executives. The discussion in general emphasized the importance of considering the problems of any particular establishment in their relation to the problems of another plant or of the entire industry. Professor Roe's paper appeared in the November issue of MECHANICAL ENGINEERING. Mr. Knowles' paper will be abstracted later.

The entertainment features of the meeting consisted of a smoker, an excursion by special train to the Hales Bar Station of the Tennessee Power Company, and a visit to the Crane Company's enamelware plant.

E. C. Patterson was in charge of the general arrangements of the meeting and his committees were made up of the entire membership of the Chattanooga Section.

[1] Air Reduction Sales Co., N. Y. Mem. A.S.M.E.
[2] Union Carbide & Carbon Research Laboratories. Mem. A.S.M.E.
[3] General Electric Co., Schenectady, N. Y.
[4] Gen'l Supt. Richmond Hosiery Mills, Richmond, Va.

Heat Transfer Through Wall Structures

ON October 22, 1923 representatives of the gypsum, brick, lime, and lumber industries met at the Bureau of Standards in Washington to discuss the Bureau's program of investigation into heat transfer through wall structures. At the present time the Bureau is securing results on the heat transfer through wall panels 6 ft. high by 3 ft. wide under dry conditions, with negligible wind pressure on two sides, and with temperature ranges from 0 deg. fahr. to 120 deg. fahr. About ten panels have been built representing typical walls used in the construction of small buildings.

Transportation and Progress

IN his valedictory as president of the National Machine Tool Builders' Association, Edward J. Kearney discussed transportation as a master key to progress. Mr. Kearney pointed out that the prosperity of the machinery industries depends upon general, mechanical, industrial, and agricultural development and prosperity, with an adequate transportation system as the master key. He specifically urged that every citizen should make a careful study of the transportation problem of the country. Every factor in economic progress, he said, points to greater production, greater wealth, and higher standards of living, implying greater consumption per capita, which necessitates more and better transportation.

Aeronautical Engineering at New York University

NEW YORK UNIVERSITY has inaugurated new courses in aeronautical engineering and industrial aviation in its department of mechanical engineering. The courses will cover aerodynamics, theory and practice of airplane design, the theory and practice of dirigible design, and the study of aireraft engines. Attention will also be given to air transportation for passengers and freight, air-mail operation, organization of landing fields, the technical and financial analysis of aviation projects, and to such applications of aviation as aerial photography, surveying, etc.

The course will be amplified by lectures by experts in the commercial-aviation field. Prof. Collins P. Bliss, head of the department of mechanical engineering, will direct the course, with Alexander Klemin, associate professor of aeronautic engineering in charge.

Progress Report of Engineering Foundation

THE following paragraphs are taken from the Progress Report which Director Alfred D. Flinn made at the October 18 meeting of the Engineering Foundation Board.

"The Committee on Concrete and Reinforced Concrete Arches, of the American Society of Civil Engineers, has organized and held one or more meetings. In response to a request from the society, $500, half the appropriation for the current year, has been paid to the society. The Civil Engineers' Committee on Steel Column Research has been appointed recently and in response to a request from the society, payment of the appropriation for this year, $1000, is being made to the society this week.

"Final payment of $334 (total $1000), to The American Society of Mechanical Engineers for its active committee studying the Properties of Steam will be made soon.

"Unfortunately, business conditions have prevented progress by the important Committee on Mining Methods. Consequently no payment has been made to the Mining Engineers.

"The Non-Ferrous Branch of the Fatigue of Metals Research has been financed for two years' work and payments are being made to University of Illinois through Engineering Foundation, as needed. Materials are being prepared and methods developed. Other branches of the project also are progressing.

"The Committee on Arch Dams has presented a commendable progress report. At suggestion of this Committee, the Director has conferred with Dr. Paul Heymans, of the Massachusetts Institute of Technology, about laboratory tests on small-scale models of dams made of celluloid, using the photoelastic method of studying stresses in engineering structures and machines. This method, developed by the General Electric Company, is being used in a study of pinions for electric-railway motors and in important designing for the Navy, in Dr. Heymans' laboratory. Dr. Heymans offers the use of laboratory and equipment, but it would be necessary for the Institute to ask reimbursement for cash expenditures for the tests, including services. A list of proposed tests has been received from the Committee. An estimate of cost has been requested from Dr. Heymans.

"Some work is being done on the Wood-Finishing Investigation including paint and varnish) at the Forest Products Laboratory. Dr. A. H. Sabin, of the Foundation's committee, incidentally to his business trips about the country, has done much to win interest and support for the project. Business depression in some branches has been a handicap.

"E. P. Polushkin recently presented a final report on his preliminary studies at the Columbia School of Mines of Internal Stresses in Metals. A few interesting facts, mostly negative, have been gained. Only $420 was expended from appropriations totaling $1100. Extensive and costly fundamental physical researches appear necessary before progress can be made along the lines on which he was working."

First 1923 Power Test Code Issued—Three to be Published in December

THE first of the 1923 Power Test Codes to be prepared for publication was the Code for Hydraulic Power Plants and Their Equipment, which made its appearance in October. This code is a revision of the Rules for Conducting Tests of Waterwheels which formed one of the group of ten test codes published by The American Society of Mechanical Engineers in 1915. A general revision of this 1915 series was authorized by the A.S.M.E. Council in 1917, and in the preparation of the Hydraulic Power Plant Code the American Society of Civil Engineers, the American Institute of Electrical Engineers, and the National Electric Light Association were invited to coöperate and to name three representatives on the joint committee. The completed code has passed through the required routine of public hearing and submission for comment. Students of hydroelectric development will be interested in comparing this new code with the old group of simple rules for conducting waterwheel tests. The personnel of Individual Committee (No. 18) on Hydraulic Power Plants is as follows: American Society of Civil Engineers: N. A. Carle, B. F. Groat, Clemens Herschel; American Institute of Electrical Engineers: H. W. Buck, H. S. Putnam, Philip Torchio; National Electric Light Association: C. M. Allen, Markham Chesver, J. A. Walls; American Society of Mechanical Engineers: J. L. Harper, R. D. Johnson, C. W. Larner, William F. Uhl (Chairman). The code is on sale to members of the coöperating organizations at a price of seventy cents per copy. To non-members the price is eighty cents.

Three test codes are in the hands of the printer for final publication and it is hoped that they will be ready for the comingA nnual Meeting. These are the sections on Genera' Instructions, Definitions and Values, and Steam Engines. The first two mentioned are supplementary to all of the other codes and will be needed by those who purchase separate codes, as there is constant reference to them in the actual test codes.

Four additional codes are in the final stages of preparation, having gone through the process of public hearing. The comments and criticisms are now being reconciled by the Committee and publication will start in the near future. These four codes are the ones on Displacement Compressors and Blowers, Internal-Combustion Engines, Reciprocating Displacement Pumps, and Evaporating Apparatus.

At the coming Annual Meeting of the A.S.M.E. there will be a public hearing on the Test Codes for Locomotives and for Steam-Generating Units. Advance copies of these will be available to any member who desires to comment or criticize.

Altogether there will be nineteen sections in the complete volume of Power Test Codes, but as widely varying amounts of time and effort have been required in the preparation of the individual codes, they are being put into type and made available as fast as they are completed. The problem of publishing all of the codes in a single volume will be taken up later.

Engineering and Industrial Standardization

Standards for Round Unslotted Bolt Heads

THE first standard to be submitted to the Sponsors by the Sectional Committee on the Standardization of Bolt, Nut, and Rivet Proportions is the series of "carriage bolt" heads. The report was prepared by Sub-Committee No. 5, of which Mr. W. M. Horton is chairman, and it consists of standard dimensions for the six well-known round unslotted bolt heads. They are called (1) Common Carriage Bolt, (2) Button-Head Carriage Bolt, (3) Fin-Neck Carriage Bolt, (4) Ribbed Carriage Bolt, (5) Elevator Bolt, and (6) Step Bolt.

The Society of Automotive Engineers and The American Society of Mechanical Engineers are joint sponsors for this Sectional Committee, so this report having been approved by letter ballot of the full committee is now before these bodies for final approval and adoption. After such approval is received it will be transmitted to the American Engineering Standards Committee for approval as a "Tentative American Standard." The proposed standards are as follows:

Radius Under Head. Up to and including $\frac{1}{2}$ in. diameter, the radius of fillet under the head shall be $\frac{1}{32}$ in. Over $\frac{1}{2}$ in. diameter the radius of fillet under the head shall be $\frac{1}{16}$ in.

Tolerances. The tolerances on head diameters, up to and including $\frac{1}{2}$-in. bolts, shall be plus or minus 0.010 in. Over $\frac{1}{2}$-in. diameter this tolerance shall be plus or minus 0.015 in. The tolerances on squares shall be plus or minus 0.010 in.

Formulas

The formulas used in computing the dimensions listed in the accompanying tables are based on the body dimensions of the bolt and are given below for the information of the manufacturer.

Carriage Bolts

Diameter of head D = 2 A + 1/16 in.
Height of head H = 1/2 A
Length of square L = 1/2 A + 3/32 in.

Button-Head Carriage Bolts

Diameter of head D = 2 A + 1/16 in.
Height of head H = 1/2 A

Ribbed Carriage Bolts

Diameter of head D = 2 A + 1/16 in.
Height of head H = 1/2 A

Fin-Neck Carriage Bolts

Diameter of head D = 2 A + 3/32 in
Height of head H = 1/2 A − 1/64 in.
Width of fin W = 1-1/2 A + 1/16 in.
Height of fin X = 3/8 A (To nearest 64th)

Elevator Bolts

Diameter of head D = 3 A + 1/8 in.
Height of head H = 1/2 A
Length of square L = 1/2 A + 3/32 in.

Step Bolts

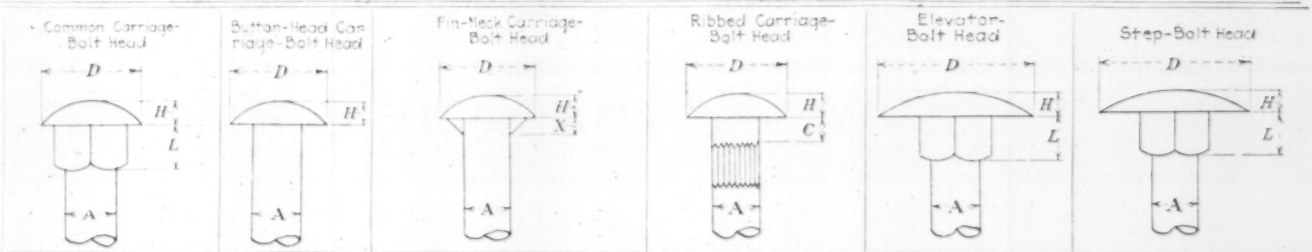
Diameter of head D = 3 A + 1/16 in.
Height of head H = 1/2 A
Length of square L = 1/2 A + 3/32 in.

Standards for Steel Flanges for High-Pressures Definitely Planned

A COMPREHENSIVE PROGRAM of standardization of steel flanges and flanged fittings was launched at an open meeting of Sub-Committee No. 3 held in the rooms of The American Society of Mechanical Engineers, Friday, October 26. This Sub-Committee is a subdivision of the Sectional Committee on the Standardization of Pipe Flanges and Fittings which was organized under the procedure of the American Engineering Standards Committee. The three Sponsors for this project are: Committee of Manufacturers on Standardization of Fittings and Valves, the Heating and Piping Contractors National Association, and The American Society of Mechanical Engineers.

The informal conference on this subject which the Sponsors held on May 23 indicated such widespread interest in this subject that it was decided to organize a new sub-committee to develop standards for flanges to withstand high-superheat temperatures and pressures from 250 to 3200 lb. per sq. in. Prof. Collins P. Bliss of the Mechanical Engineering Department of New York University who is chairman of the Sectional Committee has decided to act also as chairman of this Sub-Committee. The other members of Sub-Committee No. 3 are Messrs. J. C. Bannister, C. W. E. Clarke, Sabin Crocker, R. D. Hall, H. E. Haller, J. A. Hance, C. H. Haupt, H. C. Heaton, J. S. Hess, F. Hodgkinson, D. S. Jacobus, O. F. Junggren, M. B. MacNeille, V. T. Malcolm, W. S. Morrison, W. A. Pope, G. W. Saathoff, J. R. Tanner and H. L. R. Whitney.

STANDARD DIMENSIONS FOR "CARRIAGE" BOLTS



Diam. of Bolt	Common Carriage-Bolt Head			Button-Head Carriage-Bolt Head		Fin-Neck Carriage-Bolt Head				Ribbed Carriage-Bolt Head			Elevator-Bolt Head			Step-Bolt Head		
A	Diameter D	Height H	Length of Square L	Diameter D	Height H	Diameter D	Height H	Length of Fin X	Width of Fin W	Diameter D	Height H	Depth of Rib Below Head C	Diameter D	Height H	Length of Square L	Diameter D	Height H	Length of Square L
3/16	7/16	3/32	3/16	7/16	3/32	15/32	5/64	5/64	3/8	7/16	3/32	1/8	11/16	3/32	3/16	5/8	3/32	3/16
1/4	9/16	1/8	7/32	9/16	1/8	19/32	7/64	3/32	7/16	9/16	1/8	1/8	7/8	1/8	7/32	13/16	1/8	7/32
5/16	11/16	5/32	1/4	11/16	5/32	23/32	9/64	1/8	17/32	11/16	5/32	3/16	1-1/16	5/32	1/4	1	5/32	1/4
3/8	13/16	3/16	9/32	13/16	3/16	27/32	11/64	9/64	5/8	13/16	3/16	3/16	1-1/4	3/16	9/32	1-3/16	3/16	9/32
7/16	15/16	7/32	5/16	15/16	7/32	31/32	13/64	11/64	23/32	15/16	7/32	1/4				1-3/8	7/32	5/16
1/2	1-1/16	1/4	11/32	1-1/16	1/4	1-3/32	15/64	3/16	13/16	1-1/16	1/4	1/4				1-9/16	1/4	11/32
9/16	1-3/16	9/32	3/8	1-3/16	9/32					1-3/16	9/32	5/16						
5/8	1-5/16	5/16	13/32	1-5/16	5/16					1-5/16	5/16	5/16						
3/4	1-9/16	3/8	15/32	1-9/16	3/8					1-9/16	3/8	3/8						
7/8	1-13/16	7/16	17/32	1-13/16	7/16					1-13/16	7/16	3/8						
1	2-1/16	1/2	19/32	2-1/16	1/2					2-1/16	1/2	3/8						

Mr. H. L. R. Whitney of the M. W. Kellogg Company was elected secretary. This list includes official representatives of the American Society for Testing Materials, Hydraulic Society, Power Piping Society, National Electric Light Association, the A.S.M.E. Boiler Code Committee, and the Sponsor Bodies. A few of the members of this sub-committee were appointed "at large" because of their special interest in and knowledge of this subject.

The open meeting held on October 26, which was also this Sub-Committee's organization meeting, was attended by 50 engineers, manufacturers of this product and users as well. The session lasted all day and the following important actions were taken:

Range of Pressures for Steel Flanges. The maximum steam pressures for which these standard flanges and flange fittings shall be developed are 250, 400, 600, 900, 1350, 2000, 3200 lb. per sq. in. The maximum temperature which they are to be designed to withstand was set at 750 deg. fahr.

250- and 400-lb. Steam Standards. These two steel standards are to have the same bolt circle and number of bolts as the present American cast-iron standard for 250 lb., except that the 2- and 2½-in. sizes for the 400-lb. standard will have 8 bolts instead of 4. The other dimensions of these flanges are, however, to be modified to meet the conditions set for each.

600-lb. Steam Standard. The Sub-Committee further decided to use as the basis of the dimensions of this standard the bolt circle and the number of bolts of the present 800-lb. Hydraulic Standard developed by the A.S.M.E. Committee and published in December, 1918.

900-lb. Steam Standard. The basis for this new steam standard flange is to be the bolt circle and the number of bolts of the present 1200-lb. Hydraulic Standard developed by the A.S.M.E. Committee and published in December, 1918.

Standards for 1350-, 2000-, and 3200-lb. Steam Pressures. Flanges to withstand these pressures and the corresponding superheats are to be developed after the completion of the first four of the series. It will be noted that the seven maximum pressures selected form a geometrical series between the terms 250 and 3200.

Realizing the difficulty and inefficiency of twenty men trying to complete the details of these flange standards, Sub-Committee No. 3 elected two sub-committees. One of these headed by Mr. A. M. Houser as chairman, and Mr. H. L. R. Whitney as secretary, is to select from among the A.S.T.M. specifications the one best suited for this purpose and to set the limiting stresses and such tests as are considered to be necessary.

The second subdivision of "No. 3" is known as the "Working Committee." It has Mr. C. W. E. Clarke as its chairman and Mr. Whitney as secretary. The Working Committee has based the report of the Sub-Committee on the physical and chemical properties of cast steel. The Sub-Committee is to present its report consisting of proposed standard dimensions of flanges for 250, 400, 600 and 900 lb. per sq. in. pressure and 750 deg. fahr. to the Sectional Committee on the Standardization of Pipe Flanges at a meeting to be held in the Engineering Societies Building on Thursday, December 6.

International Standardization of Ball Bearings

THE First International Ball-Bearing Conference, held in Zurich, Switzerland, on July 9, 1923, is of considerable general interest because it was the first meeting of delegates from the different countries at which an agreement was reached to propose definite international standards for a machine element.

The Sectional Committee on the Standardization of Ball Bearings was organized under the American Engineering Standards Committee in December, 1920, to bring about an international agreement. This Committee, sponsored by the Society of Automotive Engineers and The American Society of Mechanical Engineers, found that active work in this direction was being carried on only in Sweden and Germany, and at the start, therefore, limited its work to coöperation with these countries.

Early in 1922, Mr. O. R. Wikander as Official Delegate of the Sectional Committee on Ball Bearings visited Sweden and Germany. Several meetings were held in Berlin and Gothenburg, but it was impossible at that time to find common ground for the Swedes and the Germans.

Upon Mr. Wikander's return the Sectional Committee on the Standardization of Ball Bearings made a proposal which, however, was not successful in reconciling the differences between the German and Swedish plans. The object of Mr. Wikander's second trip to Europe in October, 1922, was to bring the three proposals into harmony. After conferences with the Standard Committees and delegates in Berlin and Stockholm, the first official International Ball-Bearing Conference was called. It met in Zurich on July 9, 1923, following the conference of secretaries of the national standardizing bodies of all countries. It was thus possible for the delegates to have the advantage of the coöperation of the director of the V.S.M. Bureau of Standards (Swiss), Mr. M. Zollinger, who presided at the meeting; Dr. P. G. Agnew, the American secretary; Mr. Erik Fornander, the Swedish secretary, and Mr. W. Hellmich, the German secretary. After ten hours' discussion of the various points under consideration, Mr. H. Törnebohm of Sweden, Mr. Max Gohlke of Germany, and Mr. Wikander reached an agreement on all questions.

A few weeks before the meeting in Zurich the American delegate visited London to enlist the coöperation of the British Engineering Standards Association and the British ball-bearing manufacturers; as a result Great Britain telegraphed the Conference that the Swedish proposal was preferred, but that the German proposal would be acceptable to them if necessary to obtain international agreement.

After the Conference Mr. Wikander visited the Italian Standards Committee, and was assured that Italy would probably be willing to accept proposals of the International Conference.

On July 10 and 11 the agreements reached were embodied in a report, and this was sent to all interested countries by the Swiss Bureau of Standards, which a few days before had been made international headquarters for all standardization questions. After another meeting in Berlin the final proposals were signed on October 5, 1923, and through the V.S.M. Bureau of Standards in Zurich they will now be submitted to the standardizing bodies of all countries for ratification or comments.

The negotiations outlined above convinced all the delegates of the impossibilities of carrying out standardization negotiations by correspondence, and of the great advantages of personal discussion of the pending questions. Practically all the real progress was made during the various personal meetings of the delegates. The experience gained during these negotiations has made Mr. Wikander rather optimistic as to the possibility of international standardization of other machine elements. One of the fundamental and perhaps the most important questions to be solved is the international establishment of preferred numbers, particularly of preferred diameters. This question appears to be even more important than the agreement on a universal system of measurement.

An Ericsson Tablet

A BRONZE TABLET commemorating the services to this country of Capt. John Ericsson is to be placed on the building at 95 Franklin Street, New York City, on the site of Captain Ericsson's residence from 1844 to 1864, where in 1861–62 he designed the *Monitor* and supervised its construction. The tablet is being erected by the families of Cornelius S. Bushnell, who obtained the contract for the vessel from the Government, and those of John F. Winslow and John A. Griswold, who with Mr. Bushnell financed its construction. The tablets will bear bas reliefs of the four principals and side view of the vessel.

Corrections

In an editorial entitled "All in Six Weeks," published in the November issue of MECHANICAL ENGINEERING, the Martin bombers were erroneously included in the list of large airplanes which had failed to give sufficient satisfaction to warrant the continuation of their building. The intention was to refer to Tarrant in England and not Martin in this country. Those who have followed the tests of sinking battleships in America need not be told that the Martin bombers proved a great success in their way instead of a failure.

In Fig. 4, page 640, of MECHANICAL ENGINEERING for November, the scale for water required should range from 0 to 50 cu. ft. per sec. and not from 0 to 500 cu. ft. as printed.

LIBRARY NOTES AND BOOK REVIEWS

The Internal-Combustion Engine

THE INTERNAL-COMBUSTION ENGINE. By Harry R. Ricardo. Vol. 1: Slow-Speed Engines, 488 pp. Vol 2: High-Speed Engines, 373 pp. D. Van Nostrand & Co., New York, 1923. Cloth, 7 × 10 in., illus., $18.

THIS is one of the most complete investigations on the subject published within recent years and has been written by a man who has contributed extensively to the development of the art which he describes.

The first volume is devoted to slow-speed engines, covering the Diesel and related types, the gas engine, and the vaporizing oil engine. The chapters devoted to a discussion of the analysis of a modern gas engine and piston friction are of particular interest. The author cannot be said to be a very enthusiastic supporter of the Diesel engine. While recognizing its unquestionable value for certain uses, he says, for example, that the Admiralty was not wrong in not experimenting with Diesel engines for the propulsion of the latest types of battleships and battle cruisers in view of the limitations of the present-day types, and in view of their comparatively low commercial efficiency in a country, such as England, which is not oil-producing. It may be noticed, however, that the author does not go into the most recent developments in Diesel engines, in particular the compressorless types.

The second volume, devoted to the subject of high-speed engines, is of greater interest than the first. This may be said to be due mainly to the fact that the high-speed internal-combustion engine, unlike the low-speed type, has made truly amazing progress in the last ten years, largely under the influence of war requirements. As the author mentions, very soon after hostilities began the light, mobile, high-speed type of combustion engine applied to transport, aircraft, and later to tanks was destined to play a very important if not decisive part in the conduct of the war. As a result every effort was then made to concentrate all the available scientific talent on the high-speed engine. The campaign of intensive research which resulted from this sudden influx of scientific talent accompanied by almost inexhaustible funds for research has resulted in the production of light high-speed engines which, besides giving what a few years ago would have been considered an almost incredible power output in relation to their size and weight, can show as high an efficiency as that of the largest slow-speed engine. And what is perhaps even more important, the basic principles, both mechanical and thermodynamic, upon which the performance of such an engine depends, have been investigated in so complete and comprehensive a manner that the performance of any engine can now be gaged with accuracy from a study of the design alone; or, conversely, an engine can be designed to fulfill any specific requirement as to power output or efficiency with the same precision as in the case of a steam engine.

The author has taken an important part in this development and experimental work both during the war and since. For example, in all the engines used in the British tanks the Ricardo pistons were employed. He has therefore the necessary data and scientific equipment to present what may be termed the last word in high-speed internal-combustion engineering. The chapters of particular interest are those dealing with detonation, influence of form of combustion chamber on engine performance, mechanical design and details, piston design, and high-speed heavy-duty engines for tanks.

The work is beautifully printed and illustrated by a considerable number of finely reproduced halftones. In a way it is of particular interest to the American engineer, in that it tells about the best which has been achieved in England. On the other hand, however, it should be clearly understood that to all practical purposes the volumes deal exclusively with internal-combustion engineering as it has been developed and is today in England, with only very brief reference to French and German practice and extremely little to America. Thus, for example, in the chapter devoted to engines for road vehicles, of which probably more are built in the United States in a month than in Europe in a year, not a single American design is either described or illustrated. This makes the volumes somewhat incomplete in an important respect, but does not materially detract from their value as a clear, brief and generally reliable presentation of the subject by one who decidedly knew what he was writing about.

AIRCRAFT YEAR BOOK. 1923. N. Y., Aeronautical Chamber of Commerce of America, Inc., 1923. Cloth, 6 × 9 in., 396 pp., illus., diagrams, tables, $3.

The volume is a summary of aeronautical events during the year, with especial reference to American activities. Technical commercial and military matters are reviewed and a great amount of useful and interesting information is presented. The book gives a convenient general view of present developments.

ALUMINIUM REPAIRING. By William H. H. Platt. D. Van Nostrand Co., New York. 1922. Cloth, 5 × 7 in., 70 pp., diagrams, $1.50.

A practical manual that gives in detail methods which the author has used with success for repairing aluminum articles and for attaching aluminum to other metals.

AUTOMATIC TELEPHONE SYSTEMS, Vol. 2; Auxiliary Services and Private and Branch Exchanges. By William Aitken. Ernest Benn, London, 1923. Cloth, 8 × 11 in., 227 pp., illus., diagrams, 35s.

The second volume of this important treatise is concerned with the various auxiliary services of automatic telephone plants. Some of the important questions treated are substation equipment for working extension lines, working party lines and small installations for subscribers' offices, branches, private installations, etc. An appendix supplements the first volume by describing several new pieces of apparatus. The work is very fully illustrated with diagrams of the circuits and is a thorough record of present British practice.

CAPITAL'S DUTY TO THE WAGE-EARNER. By John Calder. Longmans, Green & Co., New York and London, 1923. Cloth, 5 × 8 in., 326 pp., tables, $2.25.

A study of the major industrial problems based upon an experience in industry extending over nearly forty years. There are chapters on the objections of labor to capitalism, on labor unionism, employers' associations, the "open" and the "closed" shop, shop organization, employees' representation, unemployment and similar questions, in which these matters are discussed and an attempt made to present practical answers. The author directs his book to the leaders in our industrial undertakings, to whom he appeals for improvement in the handling of the worker.

CHEMICAL RESISTANCE OF ENGINEERING MATERIALS. By Marston Lovell Hamlin and Francis Mills Turner, Jr. Chemical Catalog Co., New York, 1923. Cloth, 6 × 9 in., 267 pp., diagrams, tables, $5.

This book is a collection of information about the behavior of metals, wood, cement, textiles and other structural and engineering materials, when exposed to the action of chemicals. Its purpose is to assist the engineer called upon to build chemical plants, in the selection of appropriate materials for piping, containers and other apparatus. Bibliographies are included, as well as a collection of useful tables.

CONDENSED CATALOGUES OF MECHANICAL EQUIPMENT. 1923–24. American Society of Mechanical Engineers, New York, 1923. Flexible leather, 9 × 12 in., 678, pp. illus., $5.

The thirteenth edition of this reference book follows the lines of preceeding ones but is improved in detail and revised throughout. The Catalogue and Mechanical Equipment Directory sections have been enlarged.

This issue lists 3600 articles of equipment used by mechanical engineers and gives the names and addresses of 4400 firms that manufacture this equipment. Concise catalogue data from 393 of these firms are given, classified under general headings. The

directory of consulting engineers contains the names of 1000 practitioners, listed under 400 headings.

The volume is of convenient size and easy to handle. It will be useful to engineers, purchasing agents, and executives who wish information about sources of mechanical equipment, engineering materials, and other products used in power plants.

CRAIN'S MARKET DATA BOOK AND DIRECTORY OF CLASS, TRADE AND TECHNICAL PUBLICATIONS. 3d edition, 1923. G. D. Crain, Jr., Chicago, 1923. Cloth, 6 × 9 in., 497 pp., $5.

This book aims to present statistical and market data about the various industries, trades and professions, for the purpose of enabling an advertiser or merchant to obtain a picture of the field as a whole. An important feature of the book is the lists of publications covering each classification. These lists include all the important trade journals, and give the principal items of information desired by advertisers.

ELEMENTARY PRINCIPLES OF LIGHTING AND PHOTOMETRY. By John W. T. Walsh. E. P. Dutton & Co., New York, 1923. Cloth, 6 × 9 in., 220 pp., diagrams, $4.50.

This book aims to provide a simple guide to the solution of the problems most commonly met with in lighting engineering and to give both an explanation of the faults which experience has shown it necessary to avoid and of the means available for the attainment of a satisfactory result in any given case. The book is intended for electrical and gas engineers, architects, factory managers and for others who are called upon to consider matters of illumination, rather than for specialists in this field. The information is presented in readable form, requiring no previous knowledge of the subject.

ENGINEERING KINEMATICS. By William G. Smith. McGraw-Hill Book Co., New York, 1923. Cloth, 6 × 9 in., 282 pp., illus., diagrams, tables, $3.

In this textbook the author, while giving first consideration to the fundamental principles of motion, its laws, its conversion and its transfer, has also given attention to the application of these principles to the design of agencies for transmission, transportation and production. He thus endeavors to relate the study to actual engineering problems and condition, so that the student's interest may be awakened by a knowledge of the practical applications of the science.

ENGINEERING NON-FERROUS METALS AND ALLOYS. By Leslie Aitchison and William R. Barclay. (Oxford technical publications.) Cloth, 6 × 9 in., 300 pp., illus., diagrams, tables, $7.

This book aims to supply engineers and manufacturers with accurate, useful information on non-ferrous metals and alloys. Throughout the maker and user are kept in mind, and the information selected and the method of presentation are those that fit his needs.

The first section of the book deals with the non-ferrous metals and alloys generally. The reasons for their use in engineering, their constitution, casting, working, heat treatment, mechanical properties and the methods of testing them are described and explained. Section two takes up individual metals and alloys in some detail. The alloys of copper, aluminium and of nickel, together with some miscellaneous alloys, are included. The final chapter discusses the choice and specification of an alloy.

ENGLISH FOR ENGINEERS. By S. A. Harbarger. McGraw-Hill Book Co., New York, 1923. Cloth, 5 × 7 in., 266 pp., $2.

The object of this textbook has been to make the study of English definite for the engineering student, and to stimulate his interest in a brief but comprehensive survey of the immediate uses to which English may be put by the engineer. It is intended to acquaint him with the sources for the study of English both for professional and cultural needs and interests.

Professor Harbarger discusses various practical matters of ordinary professional life, such as letters of application, order, inquiry and instruction; sales letters, dictation, the composition of technical articles and reports; and cultural reading. References for collateral reading are given in each chapter.

FOUNDRY WORK. By R. E. Wendt. McGraw-Hill Book Co., New York, 1923. Cloth, 5 × 8 in., 206 pp., illus., tables, $2.

A textbook covering the general principles of foundry work, instruction in molding and core making, and in mixing and melting metals. Intended for use in colleges and by apprentices. The author is head instructor in foundry practice in Purdue University, and the book is based on his experience in teaching the subject there.

FRICTION. By T. E. Stanton. Longmans, Green & Co., New York, 1923. Cloth, 6 × 9 in., 183 pp., diagrams, tables, $4.20.

In the past it has been customary to treat the various phenomena which can be grouped under the term "friction" more with reference to the particular branch of mechanics with which the frictional effect is associated than as intimately related manifestations of certain properties of matter. In the present book the author has adopted the view that friction is an essentially molecular phenomenon, best studied as a distinct branch of mechanics; and to facilitate this has collected in a single volume the results of modern investigations into the nature and laws of friction. The book is intended for engineers and research workers in engineering and the allied sciences.

FUNDAMENTALS OF WELDING, GAS, ARC AND THERMIT. By James W. Owens. Penton Publishing Co., Cleveland, Ohio, 1923. Cloth with leather back and corners, 6 × 9 in., 659 pp., illus., $10.

A number of years ago, the Bureau of Construction and Repair of the Navy undertook a special study of the art of fusion welding. With this work Mr. Owens has been connected from the beginning and in charge of it for some years. This book, based on his experience, also makes use, by permission, of the results obtained by the investigations of the Navy and includes the matter previously published confidentially by it. The book is a complete practical manual on its subject. It sets forth the relative merits of different methods and their adaptability to different materials, the apparatus which is used, the preparation of the joints, the methods of welding, inspection, etc. Standard welding specifications are included.

"HUTTE," DES INGENIEURS TASCHENBUCH. By Akademischen Verein Hütte, Berlin. Vol. 2; second edition. Wilhelm Ernst & Sohn, Berlin, 1923. Cloth, 5 × 7 in., 1288 pp., illus., tables, $2.

The second volume of this new edition covers the important subjects of Prime Movers, Measurements, Machinery, Shipbuilding and Marine Engines, Automobile Construction, Lighting and Electrical Engineering. It has been partly rewritten and partly revised, over 200 pages having been added. The principal additions have to do with Boilers, Engines, Steam Turbines, Internal-Combustion Engines, Hoisting Machinery, and Electricity. Each section is the work of a group of specialists.

INTERNAL-COMBUSTION ENGINES, THEORY AND DESIGN. By Robert L. Streeter. Second edition. McGraw-Hill Book Co., New York, 1923. Cloth, 6 × 9 in., 443 pp., illus., diagrams, $4.

This edition has been thoroughly revised by the author, with the assistance of several other engineers who have contributed chapters on their specialties. The book is thus brought in line with present practice in design and construction and covers small gas and gasoline engines, automobile engines, large gas engines and oil engines. A chapter is devoted to the Humphrey gas pump.

DIE KONSTRUKTIONSSTAHLE UND IHRE WARMEBEHANDLUNG. By Rudolf Schafer. Julius Springer, Berlin, 1923. Cloth, 5 × 8 in., 370 pp., illus., diagrams, tables, $3.60.

This book is a clearly written account of the varieties of iron and steel used in machine and building construction, and of the effects of different methods of heat-treating upon their qualities. The author has tried to condense the voluminous literature into a book of convenient size and has had in mind the needs of designers and manufacturers of machinery and of dealers rather than those of metallurgists. Alloy steels are discussed.

MATHEMATICAL THEORY OF RELATIVITY. By A. Kopff. E. P. Dutton & Co., New York, 1923. Cloth, 5 × 8 in., 214 pp., $3.20.

The present introduction to the theory of relativity as expounded by Einstein arose out of a series of lectures delivered at Heidel-

berg in 1919–20. The object of this work is to reproduce in the simplest possible terms the investigations that have been conducted into the foundations of this theory, and as a consequence the treatment is necessarily of a mathematical nature. The mathematical and physical equipment required for study of the book is approximately that which is acquired during the first few terms of a college course.

MECHANICS OF MACHINERY: MECHANISM. By Robert C. H. Heck. McGraw-Hill Book Co., New York, 1923. Cloth, 6 × 9 in., 508 pp. diagrams, $5.

The purpose of this work on the mechanics of machines is to cover the whole field of motions and forces in machines, in a manner suitable for study and teaching and as a related and consistent whole instead of as scattered isolated branches. The present volume treats chiefly of mechanism. The material presented is arranged according to the problems in mechanism or mechanics which it presents, rather than according to kinds of machines. The ground is covered with sufficient completeness to make the book a useful reference treatise as well as a textbook.

LES MÉTHODES MODERNES D'ORGANISATION INDUSTRIELLE. By L. Benoist. Gauthier-Villars et Cie., Paris, 1923. Paper, 6 × 9 in., 208 pp., tables, 18 fr.

An introduction to management intended for young engineers. The book opens with a general survey of modern life, its activities and objects. This is followed by an account of modern methods of organization in the office and the shop. The final section deals with shop practice and includes many tables showing the time required for tool and hand operations in turning, fitting, assembling, etc.

MODERN GAS PRODUCERS. By N. E. Rambush. Benn Bros., London, 1923. Cloth, 7 × 10 in., 545 pp., illus., diagrams, tables, 55s.

An important treatise on its subject. The special problems that arise in the manufacture of producer gas and the design of producer-gas plants are treated in full detail and the specific features of each design that has been built and operated have been set forth. The book is very fully illustrated with drawings and photographs.

OIL FLOW—VISCOSITY AND HEAT TRANSFER. By R. S. Danforth. R. S. Danforth, San Francisco, 1923. Paper, 6 × 9 in., 16 pp., charts, $2.

The charts in this pamphlet show the average values of the viscosities of crude and fuel oils at various temperatures. They include data on oils from various sections of North America and are intended for use when tests on the particular oil to be pumped are not available. The temperature-drop charts, which are mainly of use in long pipe lines, take into consideration turbulence and pipe diameter, and give satisfactory results when used to design lines for a given capacity of a given oil or for forecasting the results of changing the operating conditions in existing lines. Charts are given for lines exposed to soil, air, or water, and for insulated lines.

PRACTICAL APPLICATIONS OF X-RAYS. By G. W. C. Kaye. E. P. Dutton & Co., New York, 1923. Cloth, 6 × 9 in., 135 pp., illus., diagrams, tables, $5.

In this book the author, who is head of the radiology department of the National Physical Laboratory, confines himself to the practical uses of X-rays in science and industry. A brief introductory chapter on the nature and generation of X-rays is followed by chapters on X-ray bulbs, high potential generators and methods for the measurement of X-rays. Chapter five discusses the medical applications of X-rays in diagnosis and the treatment of disease. Chapter six calls attention to industrial applications, such as the examination of metals for flaws, of explosives and ammunition, of timber, aircraft, welds, rubber and glass, the investigation of old paintings, etc.

LA RADIOTÉLÉPHONIE. By Carlo Toché. Second edition. Gauthier-Villars et Cie., Paris, 1923. Paper, 6 × 10 in., 120 pp., illus., diagrams, 10 fr.

The aim of this book is to give the general public with no special scientific knowledge a clear idea of the principles of radiotelephony, of its apparatus and of the methods of building and operating receiving stations. A chapter is devoted to the applications of telephony and its future possibilities.

REGULATION AND THE MANAGEMENT OF PUBLIC UTILITIES. By Charles Stillman Morgan. Houghton Mifflin Co., Boston and New York, 1923. Cloth, 5 × 8 in., 362 pp., tables, $2.50.

This book is devoted to a study of the management of a regulated industry. Its principal objects are the determination of the efficiency with which this industry is conducted and of the causes accounting for the degree of efficiency attained, as well as the critical examination of various measures that are used, or have been proposed, for the purpose of eliminating certain latent germs of inefficiency which the industry itself and the regulation to which it is subjected may be said to produce. The analysis is confined to the present day and the immediate future, there being no attempt to review the history of public regulation nor to outline its probable future course. The study is limited to the economic aspects of the problem and to "public utilities" in the narrow sense, railroads and other interstate carriers being excluded from it.

DER SCHIFFSMASCHINENBAU. Vol. 1. By Gustav Bauer. R. Oldenbourg, Munich and Berlin, 1923. Paper, 8 × 11 in., 157 pp., illus., diagrams, $7.25.

Some years ago Dr. Bauer published a book entitled Berechnung und Konstruktion der Schiffsmaschinen und Kessel; and also, with Dr. Lasche, one upon marine turbines. The present work is intended as a revised edition of those two books but is considerably expanded, especially by the addition of a volume on marine internal-combustion engines. The first volume is devoted to reciprocating steam engines and screw propellers. The theory is presented thoroughly, yet concisely. Great attention is given to practical design and construction of engines, condensing apparatus and screws, the subjects being discussed in detail and illustrated with many examples. An appendix, 150 pages long, discusses many important theoretical considerations, such as the flow of heat in cylinder walls, heat regeneration, critical speeds, the influence of the depth of water on the speed of ships, etc.

Succeeding volumes will take up turbines, boilers, auxiliary machinery, and internal-combustion engines. The book is well printed on good paper. It should be of interest to marine engineers and designers of steam engines.

STEEL THERMAL TREATMENT. By John W. Urquhart. D. Van Nostrand Co., New York, 1922. Cloth, 6 × 9 in., 336 pp., illus., tables, $8.

Having been engaged for many years in the production of machinery and tools, the author has been under the necessity of putting to practical use all the recently introduced processes for the heat treatment of steel. This book describes the apparatus used for heat treatment, and the processes and their adaptation to various purposes. The physical and chemical phenomena that occur are explained and an endeavor is made to coördinate the work of the laboratory and the factory.

TABELLEN UND DIAGRAMME FUR WASSERDAMPF. By Oscar Knoblauch, E. Raisch and H. Hausen. R. Oldenbourg, München and Berlin, 1923. Paper, 8 × 11 in., 32 pp., diagrams, tables, $0.50.

This pamphlet presents the results of the measurements of the specific heat of steam made during the past twenty years at the Laboratory of Technical Physics in Munich. Their importance consists not only in the new data upon the characteristic changes in the specific heat of steam with the pressure and temperature, but also in the possibility of deriving the other properties of steam numerically by calculation from the specific heat and some factors, and thus preparing steam tables by a new and more convenient method. The principal tables give the usual thermodynamic constants of steam, one for temperatures from 5 to 275 deg. cent., at five-degree intervals, the other for pressures from 0.02 to 60 kg. per sq. cm. Other useful tables and charts are also included in this pamphlet.

WOOD PATTERN-MAKING. By Herbert J. McCaslin. McGraw-Hill Book Co., New York, 1923. Cloth, 5 × 8 in., 296 pp., illus, $2.25.

For the student who desires to follow the occupation of pattern-making or to familiarize himself with the principles of that art, this book gives a clear account of the principles of molding and of pattern construction in the shape of a series of problems arranged in a progressive course. Very definite instructions as to the order of operations are given for each exercise.

THE ENGINEERING INDEX

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Exigencies of publication make it necessary to put the main body of The Engineering Index (p. 143-EI of the advertising section) into type considerably in advance of the date of issue of "Mechanical Engineering." To bring this service more nearly up to date is the purpose of this supplementary page of items covering the more important articles appearing in journals received up to the third day prior to going to press.

AIRPLANES

Wren Light. The "Wren" Light Aeorplane. Engineering, vol. 116, no. 3017, Oct. 26, 1923, pp. 526–528, 8 figs. partly on p. 530. Details of design of cantilever monoplane which tied for two prizes awarded for maximum distance flown per gal. of gasoline, at Lympne competition; important feature of design is low weight of main components.

ALLOY STEELS

Temperature and Impact Value. Temperature and Charpy Impact Value, F. C. Langenberg. Iron Age, vol.112, no. 18, Nov. 1, 1923, pp. 1170–1172, 6 figs. Investigation of influence between these elements in group of steels of varying composition, including stainless steels. Paper before Am. Iron & Steel Inst. See also Iron Trade Rev., vol. 73, no. 17, Oct. 25, 1923, pp. 1174–1179, 5 figs.

CARBURETORS

Plain-Tube, Fixed-Jet. Stewart-Warner Starts Production on New Carbureter. Automotive Industries, vol. 49, no. 17, Oct. 25, 1923, pp. 828–829, 3 figs. Die-cast body, throttle at air inlet, arrangement of jet to insure good atomization, and rugged float mechanism are chief features; design is such as to permit use of system of unit assemblies in production; manufacturing costs lower as result.

CASE-HARDENING

Gray Cast Iron. Case Hardening and Other Heat Treatment as Applied to Gray Cast Iron, H. B. Knowlton. Am. Soc. for Steel Treating—Trans., vol. 4, no. 4, Oct. 1923, pp. 494–506, 30 figs. Experiments conducted in heat-treating gray cast iron; it was found that under certain conditions gray cast iron could be made much tougher in center and at same time be given hard surface.

CONDENSERS, STEAM

Hick-Breguet Type. Condensing Plant for 20,000-Kw. Turbine at Shangai. Engineering, vol. 116, no. 3016, Oct. 19, 1923, pp. 494–496, 9 figs. partly on p. 498. Describes surface-condensing plant of Hick-Breguet type designed to condense 239,000 lb. of exhaust steam per hr. and maintain vacuum of 28 in. at exhaust inlet to condenser.

ELECTRIC WELDING, ARC

Cast Iron. Arc-welding Cast Iron Without Preheating, J. P. Kryza. Machy. (N. Y.), vol. 30, no. 3, Nov. 1923, pp. 199–200, 1 fig. In method developed by Super Arc Welding Machine Co., Detroit, Mich., neither preheating nor reheating is required, because surface welded is only slightly fused.

FORGINGS

Steel. Recent Developments in Steel Forgings, John L. Cox. Iron Age, vol. 112, no. 18, Nov. 1, 1923, pp. 1175–1177. Developments in alloy steel forgings; hardened steel rolls; crankshafts; large hollow drawn forgings; large solid forgings. See also Iron Trade Rev., vol. 73, no. 18, Nov. 1, 1923, pp. 1233–1236 and 1239, 7 figs. (Abstract.) Paper read before Am. Iron & Steel Inst.

GEAR CUTTING

Hobbing, Spiral, Bevel Gears. Hobbing, Spiral, Bevel Gears, Nikola Trbojevich. Machy. (N. Y.), vol. 30, no. 3, Nov. 1923, pp. 165–176, 16 figs. New development in gear-cutting practice that makes it possible to produce accurate spiral bevel gears by hobbing process.

GEARS

Standardization. Progress in Gear Standardization. Am. Mach., vol. 59, no. 19, Nov. 8, 1923, p. 669. Résumé of work of subcommittee of Am. Gear Mfrs. Assn. and report of action taken at meeting, Oct. 1923. See also Iron Age, vol. 112, no. 18, Nov. 1, 1923, pp. 1182–1183 and 1217–1218.

GRINDING

Production. The Elements of Production Grinding, Ellsworth Sheldon. Am. Mach., vol. 59, nos. 2, 4, 6, 8, 10 and 12, July 12, 26, Aug. 9, 23, Sept. 6 and 20, 1923, pp. 37–41, 131–133, 209–211, 277–280, 373–376, and 443–444, 42 figs. July 12: Early practice; artificial abrasives; development of production grinding. May 26: Manufacture of wheels; modified abrasives; vitrified, silicate and elastic wheels; grains and grades. Aug. 9: Selection of grinding wheels; wheel and work speeds. Aug. 23: Location and care of machine; vibration elimination; balancing, dressing and truing of wheels; causes of loading and glazing; use of grinding compounds. Sept. 6: Cause and remedy of chattering; use of steadyrests; preparing work for grinding machine. Sept. 20: Two main classes of grinding machines.

GRINDING MACHINES

Gear. Spur-Gear Grinding Machines. Iron Age, vol. 112, no. 19, Nov. 8, 1923, pp. 1237–1238, 5 figs. New unit for grinding involute teeth on production basis.

Surface. Automatic Tilting Work Table Chief Feature of New Surface Grinder. Automotive Industries, vol. 49, no. 17, Oct. 25, 1923, pp. 850–851, 2 figs. Osterholm automatic surface grinder is capable of handling wide range of production; will grind plane surfaces such as oil pans and cylinder heads with maximum dimensions of 10 in. by 40 in.

HANDLING MATERIALS

Factories. Automatic Conveying in Material Handling, L. S. Love. Iron Age, vol. 112, no. 17, Oct. 25, 1923, pp. 1105–1109, 12 figs. Vertical units and various types of horizontal conveyors in intensive use in National Cash Register works.

HEAT TRANSMISSION

Laws. The Laws of Heat Transfer. Engineering, vol. 116, nos. 3001, 3003 and 3005, July 6, 20 and Aug. 3, 1923, pp. 1–3, 69–70 and 131–132, 4 figs. Study based on Webster's experiments to determine laws of heat transfer between hot tube and fluid traversing it; deduces from Webster's experiments coefficient with which "ideal" thickness of film calculated must be multiplied in order to get actual film thickness.

HYDRAULIC TURBINES

Investigations. Water Turbine Investigations, Hubert Mawson. Engineering, vol. 114, no. 3017, Oct. 26, 1923, pp. 539–542, 14 figs. Analytical and experimental investigations. (Abstract.) Paper read before Brit. Assn.

HYDROELECTRIC PLANTS

Generators, Minimum Number Required. Minimum Number of Hydro-Electric Units to Have in Service, Ralph Brown. Power, vol. 58, no. 19, Nov. 6, 1923, pp. 722–723, 2 figs. Factors that determine number of machines to have in service; how loading of machines affects efficiency of plant; methods of supplying wattless current to system.

INDUSTRIAL MANAGEMENT

Auditing. A Management and Methods Audit, Frederick A. Waldron. Management & Administration, vol. 6, no. 4, Oct. 1923, pp. 479–481. Author advocates periodical inspection of organization and means through which money is spent.

Pay-Roll System. A Daily Balanced Pay-roll System, Lewis J. Brown. Management & Administration, vol. 6, no. 4, Oct. 1923, pp. 445–452, 3 figs. Describes system in use for past two years in plant of American Rolling Mill Co., and summarizes objects which have been obtained thereby.

Planning and Cost Control. Planning—Its Place in Cost Control, R. W. Darnell. Management & Administration, vol. 6, no. 5, Nov. 1923, pp. 605–610, 14 figs. Gives examples of piece-part, rough-stores and assembly-specification records; duties of planning department; departmental recapitulation of machine hours; planning as related to cost accounting.

LUBRICATION

Theory and Practice. Developments in Lubrication Theory and Practice, P. M. Heldt. Automotive Industries, vol. 49, nos. 12, 15, 16 and 17, Sept. 20, Oct. 11, 18 and 25, 1923, pp. 573–575, 735–739, 800–801 and 842–844, 7 figs. Sept. 20: Laws of bearing and dry friction when loads are high; experiments on grooved and ungrooved bearings. Oct. 11: Effect of surface velocity, temperature, character of material and of lubricant on frictional loss. Oct. 18: Use of oil grooves, functions, advantages and disadvantages. Oct. 25: Definition of "oiliness;" theory of colloids; test methods.

MOTOR TRUCKS

Loading and Unloading Device for. Loading and Unloading Device for Motor Vehicles. Engineering, vol. 116, no. 3016, Oct. 19, 1923, pp. 490–491, 11 figs. Describes device developed in Switzerland, aim of which is to build up material, whether it be machinery, cases, packages or loose waste substances, on platforms or in standard container, back lorry to load and raise latter by means of haulage gear which is part of equipment.

OFFICE MANAGEMENT

Rating Plan. A Practical Plan for Rating the Efficiency of an Office Organization, W. H. Leffingwell. Taylor Soc.—Bul., vol. 8, no. 5, Oct. 1923, pp. 178–188, 1 fig. Describes examination and rating plan as applied to office organization; requirements of plan of rating; divisions and subdivisions of plan; its value and method of application.

OIL ENGINES

Overheating Pistons. Overheating of Oil-Engine Pistons, H. F. Shepherd. Power, vol. 58, no. 17, Oct. 23, 1923, pp. 649–650, 2 figs. Heating of air charge, avoidance of piston heating; author points out that, with properly cooled pistons and separate scavenge pumps, much of mystery that has made it impossible to design two-stroke-cycle solid injection engines of semi-Diesel type with exactly same factors regardless of size would disappear.

OIL FUEL

Burners. The Correct Method of Using Fuel Oil, H. A. Anderson. Forging—Stamping—Heat Treating, vol. 9, no. 10, Oct. 1923, pp. 437–440. Discusses various types of fuel-oil burners and their uses as applied to forging and heat-treating furnaces; efficiencies compared.

OXY-ACETYLENE WELDING

Metallography of Welds. Metallography and Testing of Oxyacetylene Welds, J. R. Dawson. Am. Soc. for Steel Treating—Trans., vol. 4, no. 4, Oct. 1923, pp. 467–487, 18 figs. Deals with application of oxy-acetylene welding to various classes of steel and to cast iron; includes photographs illustrating effect of process on structure of metals that are welded; physical properties of welded metals. plea is made for application of principles of heat treating to welding problems.

Railway Car Shops. Oxy-acetylene Welding in Railroad Car Shops. Machy. (N. Y.), vol 30, no. 3, Nov. 1923, pp. 177–180, 9 figs. Application of oxy-acetylene welding and cutting process to production, repair a. maintenance.

PUMPS, CENTRI

Curves. Charactris Curves of Centrifugal Pumps, Russel K. Annis. Power, vol. 58, no. 17, Oct. 23, 1923, pp. 653–655, 13 figs. Comparison of flat and drooping curves; boiler-feed pumps, it is claimed, should have flat curve; large capacity desirable in circulating pumps.

PYROMETERS

Selection and Care. The Selection and Care of Pyrometers, J. W. Conzelman. Power, vol. 58, no. 17, Oct. 23, 1923, pp. 644–646. Explains fundamental principles underlying operation of four main types of electrical pyrometer (thermocouple, resistance, radiation and optical), and gives practical pointers on selection and care of thermocouple instruments, including detailed instructions for making, calibrating and installing thermocouples.

SEPARATORS

Coal. Recovering Fuel from Boiler Ash and Clinker, C. H. S. Tupholme. Power Plant Eng., vol. 27, no. 21, Nov. 1, 1923, pp. 1075–1079, 9 figs. Novel European schemes for recovering fuel from refuse; Waller, Blackett, Weber; and Columbus washers; Belgian washer employing pulsating piston; magnetic process used in Germany.

STEAM-ELECTRIC PLANTS

Belfast, Ireland. The New Belfast Power Station. Engineer, vol. 136, no. 3538, Oct. 19, 1923, pp. 415–418, 10 figs. Present capacity is 24,000 kw., details of layout and equipment.

Manchester, England. The New Barton Power Station of the Manchester Corporation. Engineer, vol. 136, no. 3537, Oct. 12, 1923, pp. 391–394, 11 figs. partly on p. 396. General layout; coaling arrangements; boiler-house plant; turbine house; circulating water system; switch house; transmission and distribution; feeder cables.

Operating Results. The Operating Results of Blackburn East Power Station (England). Engineering, vol. 116, no. 3017, Oct. 26, 1923, pp. 515–517, 12 figs. partly on supp. plates. Outline of Equipment and data on performance of station.

STEAM POWER PLANTS

Durant Motors, Elizabeth, N. J. Power Plant of the Durant Motors, Elizabeth, N. J. Power, vol. 58, no. 17, Oct. 23, 1923, pp. 638–643, 11 figs. Plant of 8750 kva. capacity designed especially for industrial service; boiler plant contains six 6020-sq. ft. water-tube boilers fired with traveling-grate stokers; turbine-driven forced-draft fans installed in front of boilers; steam for process and heating supplied by exhaust from steam-driven auxiliaries and extraction from main units.

STEEL, HEAT TREATMENT OF

Quenching. The Theory in Quenching Steels, Kotaro Honda. Am. Soc. for Steel Treating—Trans., vol. 4, no. 4, Oct. 1923, pp. 459–466, 11 figs. Review of theory of mechanism and principles involved in quenching of steels; study of quenching cracks and their causes; author develops theory based upon experimental data and suggests remedy for eliminating quenching cracks.

STEEL WORKS

Electric Drives. Adjustable Speed Motor Drives, R. W. Davis. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 10, Oct. 1923, pp. 601–615 and (discussion) 616–619, 5 figs. Discusses four types of drives used in steel mills, namely, direct-current, Sherbius or a.c. commutator, frequency converter, and Kraemer or rotary converter, and points out advantages of each.

STRESSES

Graphical Determination. On the Graphical Determination of Stress from Photo-Elastic Observations, L. N. G. Filon. Engineering, vol. 116, no. 3016, Oct. 19, 1923, pp. 511–512, 2 figs. Describes method of deriving stresses in transparent plate directly from isoclinic and isochromatic lines, and gives actual example of its application. Contribution to report of Committee of Brit. Assn. on complex stress distributions.

THE ENGINEERING INDEX

(Registered United States, Great Britain and Canada)

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

Photoprint copies (white printing on a black background) of any of the articles listed in the Index may be obtained at a price of 25 cents a page. When ordering photoprints identify the article by quoting from the Index item: (1) Title of article; (2) Name of periodical in which it appeared; (3) Volume, number, and date of publication of periodical; (4) Page numbers. A remittance of 25 cents a page should accompany the order. Orders should be sent to the Engineering Societies Library, 29 West 39th Street, New York.

ABRASIVE WHEELS

Manufacture. Outline Abrasive Plant Methods, B. A. Hildebrant. Abrasive Industry, vol. 3, no. 10, Oct. 1922, pp. 315–318, 5 figs. Describes operations at Norton Co.'s plant, especially the conveying of abrasives and work on silicate wheels.

Polishing Wheels. Polishing Wheels, Bradford H. Divine. Machy. (N. Y.), vol. 29, no. 3, Nov. 1922, pp. 218–220, 1 fig. General construction of wheels used for metal finishing. Characteristics of polishing abrasives.

ACCIDENT PREVENTION

Industrial Plants. Accident Prevention in Industrial Plants, W. G. H. Cam. Eng. Jl. (Eng. Inst. Can.), vol. 5, no. 11, Nov. 1922, pp. 537–540. Importance of accident prevention as demonstrated by results of campaigns in cement industry.

ACCIDENTS

Industrial. Industrial Accidents and Hygiene. Monthly Labor Rev., vol. 15, no. 4, Oct. 1922, pp. 159–166. Causes and prevention of accidents in iron and steel industry; lighting in relation to safety; safety activities in Pennsylvania; industrial poisons and diseases in British factories.

AERONAUTICS

Public Departments. The Organization of Public Departments in Aeronautics (De l'organisation des pouvoirs publics en matière aéronautique), Léon Jacob. Aérophile, vol. 30, no. 17–18, Sept. 1–15, 1922, pp. 264–267, 2 figs. Discusses departments of French government concerned with aeronautics, viz., ministries of public works, war, marine, colonies, post and telegraph, giving summary of activities of each.

Research. Some Aspects of Aeronautical Research, A. Ogilvie. Aeronautical Jl., vol. 26, no. 142, Oct. 1922, pp. 381–389. Notes on history of experimental work; research in war and post-war periods. Tenth annual Wilbur Wright lecture.

Safety Code. Aeronautical Safety Code. Aviation, vol. 13, no. 18, Oct. 30, 1922, pp. 606–607. Outline of work accomplished by organizations elaborating this code.

AIR COMPRESSORS

Belliss. Air Compressor Development. Beama, vol. 11, no. 5, Nov. 1922, pp. 759–761, 3 figs. The Belliss compressors, manufactured by Belliss & Morcom, Ltd.

AIRCRAFT

Gas Armor for. Gas Armour for Aircraft, F. L. M. Boothby. Aeronautical Jl., vol. 26, no. 142, Oct. 1922, pp. 413–416. Discusses problem of protecting fuel from fire in airplanes and airships.

AIRCRAFT CONSTRUCTION MATERIALS

Fabrics. Report on Goldbeaters' Skins for ZR1, M. Meadowcroft. Aviation, vol. 13, no. 20, Nov. 13, 1922, pp. 662–663. Domestic supply of skins; how skins are prepared; how goldbeaters' skin is obtained; total supply of skins; skins from South America.

AIRPLANE ENGINES

Curtiss OX-5. Test of Curtiss Eight-Cylinder Model OX-5 Engine Rated at 90 Horsepower at 1,400 Revolutions per Minute, O. C. Christiansen. Air Service Information Circular, vol. 4, no. 373, Oct. 15, 1922, 10 pp., 8 figs. Results of performance test made to obtain reliable data for use by airplane designers.

Diesel Cycle. Diesel Cycle and Airplane Engines (Le cycle Diesel et le moteur d'aviation, M. Dumanois. Technique Automobile et Aérienne, vol. 13, no. 118, 1922, pp. 90–95, 3 figs. Discusses contradictory requirements of airplane engines, properties of Diesel cycle, comparison with cycle of constant volume of combustion, adaptation to airplane engines.

Fuel Consumption. Curves for Estimating the Fuel Consumption of an Aviation Engine on the Basis of Piston Displacement and Revolutions per Minute, C. F. Taylor. Air Service Information Circular, vol. 4, no. 375, Oct. 15, 1922, 8 pp., 7 figs. Presents curves drawn for purpose of determining correct full-throttle fuel consumption for normal types of water-cooled aviation engines.

Fuel Pumps. The Bellows (Sylphon) Fuel Pump for Liberty "12" and Wright Model "H" Engines, H. C. Osborne. Air Service Information Circular, vol. 4, no. 369, Sept. 15, 1922, 5 pp., 4 figs. General description of engine-driven fuel pump; overhaul; disassembly; installation; precautions.

Geared vs. Direct Drive. F-5-L Boat Seaplane—Comparative Performance with Direct Drive and Geared Engines, W. S. Diehl. Nat. Advisory Committee for Aeronautics Tech. Notes, no. 116, Oct. 1922, 12 pp. Results of comprehensive tests made at Naval Air Station, Hampton Roads, Va., show that an F-5-L with geared engines takes off in approximately 90 per cent of time required for same airplane with standard direct-drive engines, climbs in 20 min. to altitude 20 per cent greater, and maximum speed is about 3.5 per cent greater.

Hispano-Suiza. Variation in Performance of a Hispano-Suiza (Model E) Engine with Degree of Throttle Opening, H. G. Morse. Air Service Information Circular, vol. 4, no. 354, July 15, 1922, 7 pp., 4 figs. Presents curves showing power output obtained at given throttle openings over entire speed range of engine, and specific fuel consumptions; and tables giving actual test data and performance data corrected to even speeds.

Injector, Anti-Knock. Flight Test of Anti-Knock Injector, O. C. Christiansen. Air Service Information Circular, vol. 4, no. 372, Sept. 1, 1922, 5 pp., 5 figs. Test to determine if injection of an anti-detonating compound into manifold of engine is practicable.

Starters. Report on Test of Bijur Ignition End Starter for Airplane Engines, J. W. Allen. Air Service Information Circular, vol. 4, no. 357, July 15, 1922, 12 pp., 16 figs. Test to determine characteristics and performance of Bijur rear-end starter.

AIRPLANE PROPELLERS

Internal Stresses. Internal Stresses in Laminated Construction, A. L. Heim, A. C. Knauss and Louis Seutter. Nat. Advisory Committee for Aeronautics. Report no. 145, 1922, 56 pp., 10 figs. Covers work conducted by Forest Products Laboratory of U. S. Forest Service. Review of procedure employed in investigation of sources and influence of internal stresses caused by atmospheric conditions upon tensile strength across grain in laminated construction with special reference to airplane propellers.

AIRPLANES

Aerofoils. Pressure Distribution over Thick Aerofoils—Model Tests, F. H. Norton and D. L. Bacon. Nat. Advisory Committee for Aeronautics. Report no. 150, 1922, 22 pp., 35 figs. Investigation in order to study distribution of loading over thick wings of various types.

Angular Velocity in Flight. A Study of Airplane Maneuvers with Special Reference to Angular Velocities, H. J. E. Reid. Nat. Advisory Committee for Aeronautics. Report no. 155, 1922, 9 pp., 11 figs. Investigation undertaken for purpose of increasing knowledge on behavior of airplane during various maneuvers and to obtain values of maximum angular velocities and accelerations in flight.

Barling Bomber. The Largest American Airplane. Aviation, vol. 13, no. 17, Oct. 23, 1922, p. 562, 2 figs. Describes Barling bomber, a triplane of 120 ft. spread, height of 28 ft., and overall length of 65 ft.; weighs 20 tons and capable of carrying 10,800 lb. of bombs alone, excluding weight of gasoline and crew of 4 men, 2 pilots and 2 passengers.

Bellanca CF-5. The Latest Commercial Machine for Economic Transportation. Aerial Age, vol. 15, no. 19, Oct. 1922, pp. 503–505, 1 fig. Describes airplane designed and constructed by G. M. Bellanca at Omaha, Neb. General specifications: Type, cabin monoplane carrying four passengers and pilot; span upper plane, 40 ft.; total wing area, 290 sq. ft.; overall length, 23 ft. 10 in.; weight empty, 950 ft.; useful load, 1040 lb. Machine won first prize in four contests at Monmouth, Ill.

BR2. The Navy Bee-Line Racer (BR1), Frederick H. Johnson. Aviation, vol. 13, no. 18, Oct. 30, 1922, pp. 604–605, 3 figs. Cantilever monoplane with retractable landing gear and wing radiators; 380-hp. Wright engine.

Corrosion of Steel Tubing. Interior Corrosion of Steel Struts and Its Prevention, V. M. Wade. Air Service Information Circular, vol. 4, no. 374, Sept. 1, 1922, 5 pp., 3 figs. Investigates necessity of protecting from corrosion interior of airplane parts manufactured from steel tubing, and also to develop suitable method for cleaning and coating interior of these parts.

Curtiss Army Racer. Curtiss-Army Racer—Fastest Vehicle Ever Operated, Herbert Chase. Automotive Industries, vol. 47, no. 19, Nov. 9, 1922, pp. 924–928, 7 figs. Winning machines in Pulitzer race have exceedingly small sectional area and wing section said to have lowest resistance of any known; gross weight 1950 lb.; span 19 ft.

Design. Record-Breaking Pulitzer Racers Show Advance in Plane Design, Archibald Black. Automotive Industries, vol. 47, no. 16, Oct. 19, 1922, pp. 755–759, 18 figs. American planes break world's speed record at Detroit air meet. Winner averages 206 mi. per hr. First four carry new radiator construction. Retractable-type chassis prominent construction feature. Race indicates probable trends in aircraft design.

Flying Boats. See FLYING BOATS.

Gliders. Gliders and Gliding. Sci. Am., vol. 127, no. 5, Nov. 1922, pp. 298–299 and 361, 13 figs. Discusses recent German and French gliding contests and their bearing on aeronautical progress.

Gliding Planes (Le vol à voile), André Lesage. Génie Civil, vol. 81, nos. 15, 16 and 17, Oct. 7, 14 and 21, 1922, pp. 309–315, 343–346 and 367–370, 28 figs. Oct. 7: Experiences at Rhön and Combegrasse. List and data of planes used by French and Germans at recent competitions, with descriptions. Oct. 14: Discusses flight with spread wings, ascending and descending, of various birds. Oct. 21: Wings favorable for gliding; determination of shape of flyers; steering; describes Magnon type.

Motorless Flight (Flyvning uden motor), H. C. Vogt and A. Brun. Ingeniören, vol. 31, no. 68–69, Oct. 7, 1922, pp. 415–420. Discusses flight of albatross and recent performances at Rhön competition of gliding airplanes.

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 160

Accumulators, Hydraulic
* Farrel Foundry & Machine Co.
* Hydraulic Press Mfg. Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Mchy. Corp'n

Aerial Tramways
(See Tramways, Wire Rope)

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Alloys
Phosphor Bronze Smelting Co.

Alternators
(See Generators, Electric)

Ammeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Ammonia Condensers, Fittings, etc.
(See Condensers, Fittings, etc., Ammonia)

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.

Asbestos Products
* Johns-Manville (Inc.)

Ash Handling Systems (Steam Jet)
Green Engineering Co.

Ash Lifts, Telescopic
* Gillis & Geoghegan

Autoclaves
* Farrel Foundry & Machine Co.

Babbit Metal
American Crucible Products Co.
* Medart Co.

Baffle Walls, Boiler
Brinckerhoff, H. Gordon Co.
* King Refractories Co. (Inc.)

Balanced Draft Systems
Brinckerhoff, H. Gordon Co.

Balancing Machines
* Vibration Specialty Co.

Balancing Machines, Dynamic
* Olsen, Tinius Testing Machine Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bars, Iron
* Glasgow Iron Co.

Bars, Steel
* Glasgow Iron Co.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Bronze
American Crucible Products Co.
Phosphor Bronze Smelting Co.

Bearings, Roller
* Gwilliam Co.
* Norma Co. of America
* Royersford Fdy. & Mch. Co.
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Foundry & Machine Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Chain Link
(See Chain Belts and Links)

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending Machines, Hydraulic
* Hydraulic Press Mfg. Co.

Bending & Straightening Machines
* Hydraulic Press Mfg. Co.
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller-Bearing Co.

Binder (Lenix)
* Smidth, F. L. & Co.

Bleaching Machinery
Philadelphia Drying Machinery Co.

Blinds, Rolling or Sliding
Wilson, J. G. Corp'n

Blocks, Tackle
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Blowers, Centrifugal
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Forge
Clarage Fan Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blowers, Steam (Ring Type)
* McClave Brooks Co.

Blowers, Turbine
Brinckerhoff, H. Gordon Co.
* Kerr Turbine Co.

Blueing
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Compounds
(See Compounds, Boiler)

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, Etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.

Boiler Saddles, Pressed Steel
* Glasgow Iron Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* Murray Iron Works Co.
* O'Brien, John Boiler Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Murray Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Murray Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Heine Boiler Co.
* Murray Iron Works Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* Murray Iron Works Co.
* O'Brien, John Boiler Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* Murray Iron Works Co.
* O'Brien, John Boiler Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* Murray Iron Works Co.
* O'Brien John Boiler Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Heine Boiler Co.
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* Murray Iron Works Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
Heine Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Bolts, Stove (Steel)
* Reed & Prince Mfg. Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Brass Mill Machinery
* Farrel Foundry & Machine Co.

Breechings, Smoke
* Brownell Co.
* Vogt, Henry Machine Co.

Brewers' and Bottlers' Machinery
* Vilter Mfg. Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
Brinckerhoff, H. Gordon Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

The Curtiss Sail Plane. Aerial Age, vol. 15, no. 19, Oct. 1922, p. 503, 1 fig. Dimensions: Weight empty 150 lb., loaded (1 man) 310 lb.; span 28 ft.; chord 60 in., overall length 22 ft. 11 in.; wing area 267.5 sq. ft. Hull is made of duralumin. New sailplane of silk remained aloft for two periods of 30 sec. each on Sept. 6.

Junker L-6 Monoplane. Report of Static Test of the Junker L-6 Monoplane, E. R. Weaver. Air Service Information Circular, vol. 4, no. 360, Aug. 1, 1922, 36 pp., 65 figs. Monoplane developed sufficient strength throughout various tests, with exception of control system, which is very weak. Test was conducted to determine structural strength of monoplane.

Wind Tunnel Test of the Junker L-6 Monoplane, F. W. Herman. Air Service Information Circular, vol. 4, no. 367, Sept. 1, 1922, 15 pp., 15 figs. Results of tests on 1/30-scale model constructed at McCook Field and tested at Mass. Inst. of Technology at velocity of 30 mi. per hr. In addition, runs were made, using tail as exploring plane, to determine influence of body on down wash.

Landing, Emergency. Emergency Landings from Low Altitudes—Minimum Altitude Required to Turn Back into Field in Case of Engine Failure After Take-Off, Louis P. Moriarty. Air Service Information Circular, vol. 4, no. 366, Sept. 1, 1922, 8 pp., 10 figs. Investigation to determine minimum altitude for landing required by various types of airplanes.

Landing-Field Buildings. Landing Field Buildings, Archibald Blank. Aerial Age, vol. 15, no. 19, Oct. 1922, pp. 494–499, 8 figs. Types, sizes and cost of buildings for civil airplane landing fields. Deals with hangars, shops and garages, field office and stock room, gasoline and oil houses, and miscellaneous buildings.

Mail. New Mail Plane Shows Increased Efficiency. Aviation, vol. 13, no. 17, Oct. 23, 1922, p. 560, 1 fig. Carries 400 lb. greater load than old-type DH mail planes.

Metal. Metal Aeroplane Construction. Engineer, vol. 134, no. 3488, Nov. 3, 1922, pp. 458–460, 6 figs. Discusses development, advantages and disadvantages, and refers to latest all-steel biplane, a twin-engined bombing and reconnaissance machine, built for British Air Ministry.

Racers. Detroit Race Impressions. Aviation, vol. 13, no. 17, Oct. 23, 1922, pp. 550–559, 3 figs. Great progress indicated in American design and construction. How Army-Curtiss racer was built; Navy-Curtiss, Verville, Army-Loening, Navy Bee-Line and Thomas-Morse racers. Notes on engines. Lesson of the Curtiss Marine Flying Trophy Race, by William A. Moffett.

Rogers-Day. The Rogers-Day 3-Seater Biplane. Aviation, vol. 13, no. 17, Oct. 23, 1922, p. 561, 1 fig. Commercial or sport two-seater showing excellent performance with OX5 engine. Characteristics: Span, 29 ft.; chord, 54 in.; weight light 1050 lb., useful load, 660 lb.; high speed, 85 m.p.h.

Seaplanes. See SEAPLANES.

Stability. Stability Calculations in the Process of Design, John D. North. Aeronautical Jl., vol. 26, no. 142, Oct. 1922, pp. 408–412, 1 fig. Points out that stability calculations should properly form basis of estimation of loads likely to come on airplane flight and furnish required basis for determination of controllability.

Tires and Wheels. Addendum to Information Circular, Vol. IV, No. 303, Discussion of Airplane Tires and Wheels. Air Service Information Circular, vol. 4, no. 303 (addendum), Sept. 15, 1922, 2 pp. To determine load per sq. in. of tire contact on supporting surface and its relation to supporting load and tire inflation.

Turbo-Compressors for. The Use of the Turbo-Compressor for Attaining the Greatest Speeds in Aviation, A. Rateau. Instn. Mech. Engrs.—Proc., no. 4, June 1922, pp. 795–831, 9 figs. Specific pressures and weights of air under normal atmospheric conditions. Author shows what must be done to obtain greatest possible speed from airplane. Translated from French.

Wind-Tunnel Tests. Report of Wind-Tunnel Test of DH-4B Model, C. L. Morse. Air Service Information Circular, vol. 4, no. 355, June 15, 1922, 8 pp., 6 figs. Object of test, with positive stagger, was to obtain correct tail setting for balance of airplane, which had been very tail heavy; object with negative stagger was to obtain proper balance of airplane for additional weight due to machine guns.

Wing Profiles. Joukowski's Wing Profiles (Les profils d'aile Joukowski), Maurice Roy. Aéronautique, vol. 4, no. 41, Oct. 1922, pp. 325–330, 6 figs. Theory and fundamental equations for determination of velocity limits and pressures.

AIRSHIPS

Development. The Development of Airship Navigation (Ueber die Entwicklung der Motorluftschiffahrt), August v. Parseval. Schiffbau, vol. 24, no. 1–2, Oct. 4–11, 1922, pp. 5–7, 1 fig. Discusses problem of economy in connection with increasing size of airships.

German Navy. Eight Years of Aerial Navigation in the German Navy (Acht Jahre Marineluftschiffahrt), Hans von Schiller. Luftfahrt, vol. 26, no. 7–8, Aug. 3, 1922, pp. 98–101, 13 figs. Details and performances of types of Zeppelin, Schütte-Lanz and Parseval airships in service during war.

Mooring Mast. The U. S. Navy Airship Mooring Mast. Aviation, vol. 13, no. 20, Nov. 13, 1922, pp. 661–662, 2 figs. Details of greatly perfected appliance for mooring airships in open, at Lakehurst, N. J.; constructed without any wires.

Rigid. The Longitudinal Strength of Rigid Airships, William Hovgaard. Soc. Nav. Architects & Mar. Engrs. advance paper, no. 9, for meeting Nov. 8-9, 1922, 28 pp., 17 figs. Results of study carried out by author when retained by Navy Dept. in consulting capacity in connection with design of rigid airship ZR-1.

ALIGNMENT CHARTS

Types. Modern Alignment Charts (A proposito di una forma moderna di abachi), Augusto de Marchi. Industria, vol. 36, no. 12, June 30, 1922, pp. 221–225, 12 figs. Discusses construction and application of various types; gives examples including logarithmic, projective, circular, parabolic charts and describes cubic alignment chart.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Copper. See COPPER ALLOYS.

Non-Ferrous, Under Superheat. The Use of Non-Ferrous Alloys Under Superheat, H. C. Dews. Engineering, vol. 114, no. 2966, Nov. 3, 1922, pp. 541–542, 7 figs. Consideration of properties of alloys ordinarily used in boiler fittings, valves, turbine blades, condenser tubes, economizers and superheater parts, etc., indicating probable direction of future activities.

Quartzilite. Quartzilite and Its Applications in Electric Industries (Le "Quartzilite" et ses applications dans l'électrotechnique). Bul. Technique de la Suisse Remande, vol. 48, no. 21, Oct. 14, 1922, pp. 248–251, 10 figs. Quartzilite is metallic carbide resisting temperatures up to 1700 deg. cent. made by Dummler & Matter, at Aarau, Switzerland, and is used for domestic heating purposes, foundry furnace works, etc.

White-Metal. Analysis of White Metal Alloys, E. W. Sheel. Metal Industry, (Lond.), vol. 21, no. 15, Oct. 13, 1922, pp. 337–339. Describes process of analysis by electrodeposition. Determination of copper, lead and bismuth, iron and zinc, tin, antimony and arsenic.

Zinc. See ZINC ALLOYS.

ALUMINUM

Nickel Plating of. Treatment of Aluminum Prior to Nickel Coating (Sur le traitement de l'aluminium avant son nickelage), M. E. Tassilly. Bul. de la Société Chimique de France, vol. 31–32, no. 10, Oct. 1922, pp. 973–976. Discusses various methods for preparing aluminum and the different effects on the nickel coating.

ALUMINUM ALLOYS

Alpax. Alpax—A New Aluminium Alloy, M. de Fleury. Foundry Trade Jl., vol. 26, no. 321, Oct. 12, 1922 p. 304. Describes new alloy of 13 per cent silicon and 87 per cent aluminum, known in France and United States as alpax, and in Germany as silumin. Its characteristics and application. Can be used to substitute steel castings where lightness is essential.

Calite. Future Applications of a French Metal (Applications d'avenir d'un métal Français). Industrie Electrique, vol. 31, no. 727, Oct. 10, 1922, pp. 369–373. Discusses aluminum and its alloys, aluminum bronzes, aluminum powder, calorization, and describes calite, a new aluminum alloy containing iron, nickel and some titanium.

AMMONIA COMPRESSORS

Defects, Detection of. Discharging Ammonia Compressor Troubles, T. M. Gunn. Power, vol. 56, no. 17, Oct. 24, 1922, pp. 649–651, 1 fig. Discussion of use of thermometers to detect compressor defects; proper suction and discharge conditions; chart showing correct discharge temperature for any suction pressure.

AMMONIA CONDENSERS

Types. Ruling Factors in the Selection of an Ammonia Condenser, L. C. Miller. Power, vol. 56, no. 19, Nov. 7, 1922, pp. 721–723, 5 figs. Discusses double-pipe closed-flow, atmospheric, bleeder-type and multi-tube condensers.

ARTILLERY

Development. Progress in Artillery Development, G. F. Jenks. Army Ordnance, vol. 3, no. 14, Sept.-Oct. 1922, pp. 76–85, 9 figs. Discusses sea-coast armament, hydropneumatic recoil mechanism, equilibrator system, split-trail carriage, rubber tires, ball and roller bearings, band brakes, etc.

ASH HANDLING

Underfeed Stoker Practice. Systems of Ash Discharge as Applied to Underfeed Stoker Practice, David C. Spencer. Southern Engr., vol. 38, no. 3, Nov. 1922, pp. 54–57, 9 figs. Discusses station whose load changes frequently and station whose load is constant; lays particular stress on power dump for ash removal.

AUTOMOBILE ENGINES

Carburetors. See CARBURETORS.

Diesel Type. Diesel Engines for Motor Vehicles. Automotive Manufacturer, vol. 64, no. 7, Oct. 1922, pp. 7–9, 6 figs. Diesel modified in weight and size, permitting use in motor vehicles, developed in Austria by Joseph Hindlmeier; now being manufactured in three sizes of stationary type, viz., 4½-hp. horizontal, 7-hp. vertical and 14-hp. twin vertical. Two-cycle Diesel having two pistons per cylinder, a German design, being built by Deutsche Automobile Construction Gesellschaft.

Fuel-Feed System. New Fuel-Feed System Uses Vacuum Created by Oil Pump. Automotive Industries, vol. 47, no. 16, Oct. 19, 1922, pp. 764–765, 3 figs. Acts as safety device in that car will not operate when oil supply is exhausted; vacuum increases with engine speed regardless of throttle opening; installation includes vane-type oil pump.

Heavy Oils, Use of. A Simple Device which Permits of Using Kerosene and Heavy Oil in Automobile Engines (Un dispositif simple qui permet, dans les moteurs d'automobiles, l'emploi du pétrole lampant et des huiles lourdes), Ed. Bruet. Outillage, vol. 6, no. 41, Oct. 14, 1922, pp. 1384–1385, 1 fig. Consists of more effective atomizing and distributing system. Results of tests made show that it is entirely satisfactory.

Lubrication. Danger in the Crankcase, E. F. Lowe. Commercial Vehicle, vol. 27, no. 6, Oct. 15, 1922, pp. 14–16, 4 figs. Changes taking place in lubricating oil, its contamination, winter and summer dilution, formation of emulsion, etc.

The Real Function of the Oil Gage, E. F. Lowe. Commercial Vehicle, vol. 27, no. 7, Nov. 1, 1922, pp. 14–15, 4 figs. Discusses various lubricating systems and explains oil pressures; effect of high speed on pressures.

Pistons. See PISTONS, Aluminum.

Radiator Cores. Making Fin and Tube Radiator Cores, Herbert Chase. Automotive Industries, vol. 47, no. 19, Nov. 9, 1922, pp. 929–931, 3 figs. Tubes are drawn, inserted in and soldered to fins punched from sheet brass; single sections are then assembled into one-piece cores; single operator makes 9000 ft. of tubing per day.

AUTOMOBILE FUELS

France. Our Resources in Automobile Fuels (Nos ressources en Carburants), P. Mallet. Journal des Usines à Gaz, vol. 46, no. 20, Oct. 20, 1922, pp. 305–308. Discusses use of distillation products, alcohol synthetic fuels, low-temperature carbonization and by-products, in search for suitable fuel.

[See also GASOLINE.]

AUTOMOBILES

Bentley. The Three-Litre Bentley. Auto, vol. 27, no. 38, Sept. 21, 1922, pp. 785–788, 11 figs. Features of design are overhead valve gear and general accessibility. Details of engine, clutch and rear axle.

Bignan. The New 1923 Model Bignan. Auto, vol. 27, no. 37, Sept. 14, 1922, pp. 763–766, 13 figs. Front-wheel braking adopted; overhead valve system. Details of engine and clutch and gear.

Chassis Friction Losses. Chassis Friction Losses, E. H. Lockwood. Soc. Automotive Engrs.—Jl., vol. 11, no. 5, Nov. 1922, pp. 415–426 and (discussion) 426–429, 15 figs. Loss of power due to friction of various parts of chassis were investigated by dynamometer, for purpose of determining amount of internal friction resistance of front or rear wheels and for measurement of power that can be delivered at rear wheels with comitant rate of fuel consumption. Results of tests are shown in charts and tables.

aimler and B. S. A. New Daimler and B. S. A. Cars. Autocar, vol. 49, no. 1411, Nov. 3, 1922, pp. 898–901, 12 figs. Describes 12-hp. 6-cylinder Daimler cars, and 11-hp. 4-cylinder and 12hp. 6-cylinder B. S. A. cars.

Dort. Dort Announces Its First Six-Cylinder Product, J. Edward Schipper. Automotive Industries, vol. 47, no. 19, Nov. 9, 1922, pp. 922–923, 2 figs. New car is similar to four except in external appearance; has 114-in. wheelbase; engine is Falls model T-8000; new silicon-chrome alloy, called silcrome-employed for valves.

Electric Wiring. Electric Wiring for Automobiles, William S. Haggott. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 430–431 and (discussion) 431–432. Discusses present practice with regard to three main divisions of electric wiring, namely, high-tension ignition, lighting and starting circuits. Suggests adoption of standard color scheme whereby character and service of each separate circuit on any car would be indicated by color of wires used.

Fiat. The 10-15 Hp. Fiat. Auto, vol. 27, no. 41, Oct. 12, 1922, pp. 849–852, 13 figs. Details of general arrangement, engine, clutch, etc.

Gasoline-Electric. A New Petrol-Electric Motor Transport, vol. 35, no. 921, Oct. 23, 1922, pp. 505–508, 8 figs. Detail description of new petrol-electric chassis, 3 to 4 tons, by Frost-Smith; 4-cylinder White and Poppe engine; Solex carburetor transmissions; control box.

Humber. A New 8 Hp. Humber. Autocar, vol. 49, no. 1408, Oct. 13, 1922, pp. 674–676, 7 figs. Details of new 4-cylinder car.

London Show. Trend Toward Smaller Models Feature of British Show, M. W. Bourdon. Automotive Industries, vol. 47, no. 19, Nov. 9, 1922, pp. 909–918, 17 figs. Noticeable increase in number of models and in 4-cylinder engines of less than 120 cu. in. displacement.

Manufacture of Parts. Some Unique Features of Automobile Production, William Dunk. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 398–401. Discusses Franklin automobile designs in regard to production of air-cooled cylinder, making of case-hardened crankshafts and machining of duralumin connecting rods; comment upon experiments made with view to producing hot-swaged rear-axle drive shafts.

Mercer. Mercer Adds Six to Present Four-Cylinder Line, Herbert Chase. Automotive Industries, vol. 47, no. 16, Oct. 19, 1922, pp. 760–763, 4 figs. New chassis has same wheelbase and general characteristics as older type; changes include entirely new power plant, stiffer frame, and new three-quarter floating axle.

Palladium. The 15 Hp. Palladium Car. Auto, vol. 27, no. 42, Oct. 19, 1922, pp. 869–872, 11 figs. Built by Palladium Autocars, Ltd., London; monobloc engine, gear and overhead valves; detailed description.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Foundry & Machine Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Burrs (Steel, Brass & Copper)
* Reed & Prince Mfg. Co.

Bushings, Bronze
American Crucible Products Co.
Phosphor Bronze Smelting Co.
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equipment & Engrg. Co.

Cable Railways
(See Railways, Cable)

Cable Wire
(See Rope, Wire)

Cables, Electrical
(See Wire & Cables, Electrical)

Cableways, Excavating
Flory, S. Mfg. Co.
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Flory, S. Mfg. Co.
Lidgerwood Mfg. Co.
Mundy, J. S. Hoisting Engine Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Capstans, Electric
Mundy, J. S. Hoisting Engine Co.

Cars, Freight Elevator
Eastern Machinery Co.

Casehardening
* American Metal Treatment Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* United States Cast Iron Pipe & Fdry. Co.

Castings, Brass
Weatherly Foundry & Mfg. Co.

Castings, Brass & Bronze
* Lunkenheimer Co.

Castings, Bronze
American Crucible Products Co.
Phosphor Bronze Smelting Co.

Castings, Die-Moulded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Friction
Brown Clutch Co.

Castings, Gray Iron
Weatherly Foundry & Mfg. Co.

Castings, Heavy
* Farrel Foundry & Machine Co.
* Toledo Machine & Tool Co.
* United States Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
Brown Clutch Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
* Cole, R. D. Mfg. Co.
* Falls Clutch & Machinery Co.
* Farrel Foundry & Machine Co.
* Franklin Machine Co.
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
Lidgerwood Mfg. Co.
* Lunkenheimer Co.
* McClave Brooks Co.
* Murray Iron Works Co.
* Roversford Fdry. & Mch. Co.
* Toledo Machine & Tool Co.
* United States Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Farrel Foundry & Machine Co.
* Hooven, Owens, Rentschler Co.
* Lunkenheimer Co.
* Murray Iron Works Co.
* Vogt, Henry Machine Co.

Castings, Steel
Mackintosh-Hemphill Co.

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugal Blowers, Pumps
(See Blowers, Pumps, etc., Centrifugal)

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Machine Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chain Grate Stokers
(See Stokers, Chain Grate)

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
* Diamond Chain & Mfg. Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker Supply Co.

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Steel
(See Stacks, Steel)

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Magnetic
* Heald Machine Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Hendrick Mfg. Co.

Cinder Mills
(See Mills, Cinder)

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Clamps, Wire Rope
(See Wire Rope Fastenings)

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Eastern Machinery Co.
* Falls Clutch & Machinery Co.
* Farrel Foundry & Machine Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Coal
Cosgrove & Co.
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Beaumont, R. H. Co.
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Shepard Electric Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
* Beaumont, R. H. Co.
* Gifford-Wood Co.

Coatings, Metal Protecting
Metals Casting Co. of America
Silumite Products Corp'n

Cocks, Air and Gage
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
* Medart Co.
* Roversford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Republic Flow Meters Co.
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compounds, Boiler
Unisol Mfg. Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
Norwalk Iron Works Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Norwalk Iron Works Co.
* Worthington Pump & Machinery Corp'n

Concrete Hardener
Sonneborn, L. Sons (Inc.)

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* United States Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Contact Points (Electrical), Silver and Platinum
Wilson, H. A. Co.

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.
* Simplex Valve & Meter Co.

Conveying Machinery
* Beaumont, R. H. Co.
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Mach. Co.

Conveyor Systems, Pneumatic
*Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.

Paris Show. Continental Design Features Small Overhead Valve Engines, W. F. Bradley. Automotive Industries, vol. 47, no. 17, Oct. 26, 1922, pp. 807–813, 28 figs. Paris show finds European engineers seeking mechanical efficiency and low operating costs. Little attempt to reduce production costs through simplification of design. Four-wheel brakes on cars of all sizes.

The Paris Salon. Motor Transport, vol. 35, nos. 919 and 920, Oct. 9 and 16, 1922, pp. 443–446 and 471–475, 31 figs. Details of representative exhibits as exemplified by leading French manufacturers. See also Autocar, vol. 49, no. 1408, Oct. 13, 1922, pp. 681–685, 15 figs.

Rolls-Royce. A 20 Hp. Rolls-Royce. Auto, vol. 27, nos. 40 and 41, Oct. 5 and 12, 1922, pp. 835 and 855–856, 7 figs. Particulars of new six-cylindered car. Details of engine, gear, etc.

New 20 Hp. Rolls Royce Has Overhead Valves and Unit Powerplant, M. W. Bourdon. Automotive Industries, vol. 47, no. 17, Oct. 26, 1922, pp. 814–817, 5 figs. Design differs widely from old 40–50-hp. chassis; has block cylinders with detachable head, battery ignition, cooling control, and semi-elliptic springs.

Rover. The 8 Hp. Rover Chassis. Automobile Engr., vol. 12, no. 167, Sept. 1922, pp. 258–264, 12 figs. Detailed description of engine and its arrangement; clutch, gear box, rear axle, front axle and steering gear.

Spline Shafts. Processing Spline Shafts by a New Method, James A. Ford. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 433–434, 4 figs. Process devised by author, evolved to eliminate difficulties incident to finishing of spline and body portions of spline shafts used in transmission gearing, by grinding after shaft has been hardened.

Springs. See SPRINGS, Automobile.

Straker-Squire. The 15-Hp. Straker-Squire Car. Auto, vol. 27, no. 39, Sept. 28, 1922, pp. 805–808, 12 figs. Engine is monobloc type with clutch; gear is separate, and power is transmitted by cardan to spiral bevel-driven live back axle.

Streamline. Breaking New Ground. Autocar, vol. 49, no. 1410, Oct. 27, 1922, pp. 791–793, 7 figs. Describes North-Lucas car, a streamline design in which five-cylinder air-cooled radial engine forms compact unit with three-speed gear box and worm final gear.

Vauxhall. The New 23-60 Hp. Vauxhall Chassis. Automobile Engr., vol. 12, no. 168, Oct. 1922, pp. 290–298, 18 figs. Four-cylinder overhead-valve engine with Lanchester balancer; electric equipment; gear box; clutch; steering gear.

Wigan-Barlow. The Wigan-Barlow Car. Auto, vol. 27, no. 43, Oct. 26, 1922, pp. 903–905, 8 figs. Monobloc cylinders with piston stroke of 120 mm., capable of developing over 27 hp. at 2000 r.p.m.

AVIATION

Air-Mail Service. The Present Status of the Air-Mail Service, E. H. Shaughnessy. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 435–437. Outlines history of service, describes routes and divisions, and gives listing of present landing fields and radio stations; data on present equipment, casualties and cost of operation.

[See also FLIGHT.]

B

BEARING METALS

Babbitt. Selection and Use of Babbitt Metal, L. D. Allen. Machy. (N. Y.), vol. 29, no. 3, Nov. 1922, pp. 211–213, 1 fig. Explains why there are such wide variations in different brands of bearing metals; points out danger of selection by analysis alone, and gives practical advice on melting and pouring of babbitt metal for bearing liners; outlines causes of shrinkage when cast, and emphasizes importance of pouring and casting metal at low temperature.

BEARINGS, ROLLER

Inspecting by Machine. Inspecting Bearing Rollers by Machine. Machy. (Lond.), vol. 21, no. 524, Oct. 12, 1922, pp. 40–41, 3 figs. Describes machine developed by Bock Bearing Co., Toledo, O., which automatically inspects and sorts rollers at rate of 3000 per hr., thereby lowering cost of inspection.

Railway. Survey of the Questions of Railroad Bearings (Uebersicht uber Eisenbahnlagerfragen). Zeit. des Osterr. Ingenieur u. Architekten-Vereines, vol. 75, no. 35–36, Sept. 8, 1922, pp. 171–177, 12 figs. Discusses application of ball and roller bearings in connection with report of Swedish state railways on subject.

Roller Bearings for Heavy Rolling Stock (Wälzlager im schweren Schienenfahrzeugbau), H. Ayasse. Verkehrstechnik, vol. 39, nos. 37 and 40, Sept. 15 and Oct. 6, 1922, pp. 473–475 and 501–504, 21 figs. S. K. F. standards of ball and roller bearings for medium and heavy rolling stock and results of tests. Construction and friction conditions in pendulum and cylindrical roller bearings and their development.

BELT DRIVE

D. C. Motors vs. Group Drive with Belting as Compared to D-C Motors, Louis W. Arny. Belting, vol. 21, no. 4, Oct. 1922, pp. 13–16, 4 figs. First cost is drawback to motors; motors vs. belt efficiency; belt maintenance.

BICYCLES

Crankless Drive. New Bicycle Drive. Times Trade & Eng. Supp., vol. 11, no. 225, Oct. 28, p. 162, 1 fig. Describes Jaray bicycle which embodies new form of driving mechanism designed by one of constructors of Zeppelin Airship Co. There is no crank and no chain, but two levers, one on each side, pivoted on their upper ends.

Manufacture of Frame Parts. Making Pressed-steel Bicycle Frame Parts. Machy. (N. Y.), vol. 29, no. 3, Nov. 1922, pp. 184–186, 7 figs. Notes on making seat-post clusters, crank hanger brackets; drawing bosses and assembling reinforcements. Practice followed by New England Pressed Steel Co., Natick, Mass.

BLAST FURNACES

Air Heaters. The Influence of Gas and Air Velocity on the Heat Transmission in the Grating of Blast-Furnace Air Heaters (Ueber den Einfluss der Gas- und Windgeschwindigkeit auf den Wärmeubergang im Gitterwerk von Hochofen-Winderhitzern), C. Schwarz. Stahl u. Eisen, vol. 42, nos. 36, 37, 38 and 40, Sept. 7, 14, 21 and Oct. 5, 1922, pp. 1385–1392, 1424–1430, 1456–1460 and 1519–1523, 13 figs. Discusses laws of Fourier and Nusselt. Results of numerous tests show that the Nusselt law modifications hold true for conditions in blast-furnace air heaters. Heat and gas balances. Comparison of results with other measurements.

Modern Practice. The Bases of Modern Blast-Furnace Practice, A. K. Reese. Iron & Coal Trades Rev., vol. 105, no. 2845, Sept. 8, 1922, pp. 323–327, 2 figs. Deals with prime factors in blast-furnace practice: preparation of materials, furnace design, auxiliary equipment, and method of operation. (Abridgment.) Paper read before (Brit.) Iron & Steel Inst.

Operation. Effect of Superheat, Drying and Surcharging the Air with Oxygen in Blast Furnace Operations (Influence de la surchauffe, de la dessiccation et de la suroxygénation du vent soufflé sur la marche des hauts-fourneaux), M. Derclaye. Révue Universelle des Mines, vol. 15, no. 1, Oct. 1, 1922, pp. 99–160, 6 figs. Discusses heat balance, consumption of coke, economies in motive power, furnace linings, etc.; gives working figures for operations at Isabella blast furnace of Carnegie Co.; also discusses conditions and limits of oxygen surcharge.

BOILER FEEDWATER

Regulators. Feed-Water Regulators for Steam Boilers, W. H. Wakeman. Southern Engr., vol. 37, no. 6, and vol. 38, nos. 2 and 3, Aug., Oct. and Nov. 1922, pp. 50–53, 61–64 and 42–44, 33 figs. Describes various types and their operation, and how valves in connecting pipes are used; control of power boiler-feed pumps.

Treatment. Feedwater for Steam Boilers (Matarvatten for angpannor), D. Aufhäuser. Teknisk Tidskrift, vol. 52, no. 31, Aug. 5, 1922, pp. 491–495. Behavior of water in boiler; composition of scaling; softening, etc.

Feedwater Purification Without Lime Addition (Speisewasserreinigung ohne Kalkzusatz), H. Frey. Archiv für Wärmewirtschaft, vol. 3, no. 8, Aug. 1922, p. 155, 1 fig. Describes Roku water-purification process and apparatus for removal of scale-producing salt.

BOILER FIRING

Wood as Fuel. Burning Wood (Om Vedbraendsel), L. B. Schibbye and S. Scholdström. Teknisk Ukeblad, vol. 69, no. 37, Sept. 15, 1922, pp. 338–340, 2 figs. Economic firing of wood under boiler; temperatures obtainable. Chart for calculations and examples.

BOILER PLANTS

Design. Economics of Boiler Plant Design, P. F. Walker. Combustion, vol. 7, no. 4, Oct. 1922, pp. 198–201, 2 figs. Load and fuel characteristics; fuel cost of steam; factors in ultimate economy; investment, etc.

BOILER TUBES

Polarized Mercury, Effect of. The Effect of Polarized Mercury on Boiler Tubes, Geo. L. Fowler. Ry. & Locomotive Eng., vol. 35, no. 10, Oct. 1922, pp. 255–257, 11 figs. Account of investigation of boiler compound known as polarized mercury manufactured by Bird-Archer Co., New York.

Slag Formation. How to Combat Formation of Slag on Boiler Tubes, Harry H. Bates. Am. Gas Jl., vol. 117, no. 17, Oct. 21, 1922, pp. 370 and 372–375, 1 fig. Conclusions arrived at after extensive tests of coals for slag-forming properties.

Studies Boiler Tube Slag Formation. Iron Trade Rev., vol. 71, no. 17, Oct. 26, 1922, pp. 1127–1128, 2 figs. Outline of extensive study of boiler operation conducted by Westinghouse Elec. & Mfg. Co., under supervision of Harry H. Bates.

BOILERS

Chemical Principles. The Chemical Principles of Boiler Efficiency. Wm. St. J'S-Findlay. Indus. Management (Lond.), vol. 8, no. 8, Nov. 2, 1922, pp. 255–256. Notes on investigation of chemical principles of combustion by means of heat-balance sheet, and suggestions for reducing loss through unburned carbonaceous matter in ashes.

Codes, A.S.M.E. Work of A.S.M.E. Boiler Code Committee. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 743–758, 7 figs. Preliminary report on rules for construction of unfired pressure vessels; rules for autogenous welding, forge welding and brazing. Revision of heating boiler section of A.S.M.E. Boiler Code, 1922. Preliminary report on rules for construction of boilers used exclusively for low-pressure steam-heating, hot-water heating, and hot-water supply.

Corrosion. Boiler Scale, Its Origin and Measures for its Prevention and Elimination in Steam Generators, Especially Locomotives and Cooling Elements (Kesselstein, sein Entstehen und Massnahmen zur Verhutung und Beseitigung in Dampferzeugern, insbesondere Dampflokomotiven, und in Kühlelementen), H. Ziemert. Glasers Annalen, vol. 91, nos. 6 and 7, Sept. 15 and Oct. 1, 1922, pp. 86–92 and 110–114, 9 figs. Address before German Mech. Soc.

Electrolytic Protection for Boilers and Condensers (Elektrolytische Schutzanlagen für Kessel und Kondensatoren), H. Philippi. Archiv für Wärmewirtschaft, vol. 3, no. 8, Aug. 1922, pp. 151–153, 10 figs. Causes of corrosion and its prevention; prevention of boiler-scale formation. Describes protective installations with zinc plates and electric curents, advantages and operating results.

Feeding Traps. Traps for Boiler Feeding, H. A. Jahnke. Power Plant Eng., vol. 26, no. 21, Nov. 1, 1922, pp. 1059–1062, 9 figs. Experiences in using them for boiler feeding. Difficulties encountered and how they were overcome.

Heat Losses. Determination of Heat Losses in the Waste Gases of Steam Boilers (Sulla determinazione della perdita di calore nei gas d'uscita di un apparecchio di riscaldamento), Stefano Pagliani. Giornale di Chimica Industriale ed Applicata, vol. 4, no. 9, Sept. 1922, pp. 391–392. Discusses heat efficiency of boilers and heat losses and develops formulas for calculating them.

Inspection and Registration. The Inspection and Registration of Steam Boilers. Power, vol. 56, no. 17, Oct. 24, 1922, pp. 651–652. Points out that general adoption of A.S.M.E. code and acceptance of certificates of members of Nat. Board of Boiler and Pressure Vessel Inspectors would eliminate present confusion and benefit manufacturers and users of boilers.

Kestner. Utilisation of Waste Heat. Iron & Coal Trades Rev., vol 105, no. 2853, Nov. 3, 1922, p. 651, 2 figs. Describes Kestner boiler, consisting of two drums connected together by long, straight tubes, arranged along drums in repeated V formation, each V consisting of double row of tubes.

Locomotive. See LOCOMOTIVE BOILERS.

Oil-Fired. From Coal to Oil in Twenty-Six Days. Power, vol. 56, no. 19, Nov. 7, 1922, pp. 712–713, 5 figs. New York Central Ry. changes six boilers from coal to fuel oil at its Yonkers plant.

Stack Height. Stack Height To Supply Draft Power, H. Misostow. Power, vol. 56, no. 17, Oct. 24, 1922, pp. 638–640. Points out that latest boiler developments have greatly increased resistance to draft in fuel bed and air passages; stack, in addition to conveying gases, must act as generator of power for operating boiler. Discusses connected load and mechanical efficiency.

Waste-Heat. Modern Waste Heat Boiler (En modern avgaspanna), Holger Lundberg. Teknisk Tidskrift, vol. 52, no. 29, July 22, 1922, pp. 465–469, 8 figs. Report from Engineers' Academy on efficiency of Afzelius boiler.

Water-Tube. See BOILERS, WATER-TUBE.

BOILERS, WATER-TUBE

Spearing. The Spearing Boiler. Indian & East. Engr., vol. 51, no. 2, Aug. 1922, pp. 79–82, 5 figs. Describes two types of Spearing boiler, first with longitudinal drum for smaller sizes and second with cross drum for boilers of larger capacity. Both are of sectional header class, and main distinctive features are (1) downcomer pipes, (2) reservoir mud drum, (3) enlarged nipples, and (4) straight headers.

BORING MACHINES

Surfacing and. A Large Surfacing and Boring Machine. Machy. (Lond.), vol. 21, no. 526, Oct. 26, 1922, pp. 103–107, 5 figs. Built by H. W. Kearns & Co., Ltd., Manchester, England, for machining turbine casings and condensers. See also Engineer, vol. 134, no. 3484, Oct. 6, 1922, p. 360, 3 figs. partly on p. 361.

BRASS

Internal Stresses. The Effect, Determination and Elimination of Internal Stresses in Cold Wrought Brass and Nickel Silver, G. L. Thirkell. Commonwealth Engr., vol. 9, nos. 11 and 12, June 1 and July 1, 1922, pp. 405–410 and 446–451 and vol. 10, no. 1, Aug. 1, 1922, pp. 18–22, 30 figs. Results of investigations carried out at Brown Firth research laboratories, Sheffield, England.

BRIQUETTING

Flue Dust and Scrap. Briquetting Flue Dust and Scrap, A. L. Stillman. Iron Trade Rev., vol. 71, no. 19, Nov. 9, 1922, pp. 1269–1272, 5 figs. Progress during past three years had led to installation of plant in Cleveland, Ohio, for making briquets from steel turnings and one in Buffalo, N. Y., for briquetting blast-furnace flue dust.

C

CABLEWAYS

Bi-Cable System. The Aerial Wire Ropeway at Trimdon Grange Colliery, R. S. Tate. Iron & Coal Trades Rev., vol. 105, no. 2850, Oct. 13, 1922, pp. 531–534, 8 figs.; also Colliery Guardian, vol. 124, no. 3224, Oct. 13, 1922, pp. 895–896. Describes bi-cable ropeway erected for disposal of large quantity of pit refuse. Details and advantages of system. (Abstract.) Paper read before North of England Inst. Min. & Mech. Engrs.

Conveyors, Ice
* Gifford-Wood Co.

Conveyors, Screw
* Gifford-Wood Co.

Coolers, Brine
* Frick Co. (Inc.)

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Corliss Engines
(See Engines, Steam, Corliss)

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Couplings, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Fawcus Machine Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
* Medart Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* Farrel Foundry & Machine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
* Medart Co.
* Royersford Foundry & Machine Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Union
(See Unions)

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Northern Engineering Works

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.

Cranes, Locomotive
* Brown Hoisting Machinery Co.

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Crushers, Clinker
* Farrel Foundry & Machine Co.

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Farrel Foundry & Machine Co.
* Worthington Pump & Machinery Corp'n

Crushers, Ore & Rock
* Farrel Foundry & Machine Co.

Crushers, Roll
Eastern Machinery Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Farrel Foundry & Machine Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cupolas
* Bigelow Co.
Northern Engineering Works

Curtains, Steel, Rolling
Wilson, J. G. Corp'n

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
Haynes Stellite Co.
* Whitney Mfg. Co.

Cylinders Rebored
* Hooven, Owens, Rentschler Co.

Damper Regulators
(See Regulators, Damper)

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Mundy, J. S. Hoisting Engine Co.

Die Castings
(See Castings, Die Moulded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Blanking
* Bliss, E. W. Co.
* Toledo Machine & Tool Co.

Dies, Punching
* Bliss, E. W. Co.
* Toledo Machine & Tool Co.

Dies, Sheet Metal Working
* Bliss, E. W. Co.
* Toledo Machine & Tool Co.

Dies, Thread Cutting
Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Doors, Sidewalk Elevator (Automatic Safety)
* Gillis & Geoghegan

Drafting Room Furniture
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Drawing Instruments
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Drawing Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Flory, S. Mfg. Co.
Mundy, J. S. Hoisting Engine Co.
Lidgerwood Mfg. Co.
* Morris Machine Works

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
* Johns-Manville (Inc.) Manufacturing Equipment & Engrg. Co.

Drop Forgings, Hammers, etc.
(See Forgings, Hammers, etc., Drop)

Dryers, Rotary
* Bigelow Co.
* Farrel Foundry & Machine Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Philadelphia Drying Machinery Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
Clarage Fan Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.

Dustproofing Materials
Sonneborn, L. Sons (Inc.)

Dyeing Machinery
Philadelphia Drying Machinery Co.

Dynamic Balancing Machines
(See Balancing Machines, Dynamic)

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Electric Generators, Hoists, Trucks Welding, etc.
(See Generators, Hoists, Trucks, Welding, etc., Electric)

Electric Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Electric Measuring Instruments
(See Instruments, Electrical Measuring)

Electric Supplies
* General Electric Co.
* Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.

Elevators, Electric
Eastern Machinery Co.
Northern Engineering Works

Elevators, Inclined
Otis Elevator Co.

Elevators, Passenger and Freight
Eastern Machinery Co.
Northern Engineering Works
Otis Elevator Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.

Engine Stops
* Schutte & Koerting Co.

Engineers, Consulting
(See Professional Engineering Service Section)

Engines, Blowing
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Engines, Distillate
Western Machinery Co.

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Otto Engine Works
Western Machinery Co.

Engines, Gasoline
* Climax Engineering Co.
Otto Engine Works
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoist
* Hooven, Owens, Rentschler Co.

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
Clyde Iron Works Sales Co.
Flory, S. Mfg. Co.
Lidgerwood Mfg. Co.
* Morris Machine Works
Mundy, J. S. Hoisting Engine Co.
Western Machinery Co.

Engines, Kerosene
* Climax Engineering Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Climax Engineering Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
* Ward, Chas. Engineering Wks.
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
Western Machinery Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Otto Engine Works
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis Chalmers Mfg. Co.
* Climax Engineering Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Murray Iron Works Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* Brownell Co.
Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Ridgway Dynamo & Engine Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
Clarage Fan Co.

CARBURETORS

Controls. Tests of Back-Suction and Air-Bleed Type Mixture Controls in Flight, C. F. Taylor. Air Service Information Circular, vol. 4 no. 368, Sept. 1, 1922, 12 pp., 5 figs. Tests to determine effect on engine performance of several types of back-suction and one type of air-bleed carburetor mixture controls under actual flight conditions, in order to develop more satisfactory forms of control.

Zenith. Test of a Zenith Carburetor, Model U. S. 52 Fitted with "Plain Tube" and Britton Type Discharge Nozzles, J. M. Miller. Air Service Information Circular, vol. 4, no. 370, Oct. 15, 1922, 24 pp., 18 figs. Test conducted to determine metering characteristics of carburetor (1) as used in service on Liberty "6" and "12" aviation engines, (2) fitted as a "plain tube" carburetor (compensating fuel passage blank), and (3) with Britton-type discharge nozzles.

CARS

Indian Railway. Indian Railway Conference Association. Full Report of the Standard Wagon Revision Sub-Committee. Indian & East. Engr., vol. 51, no. 2, Aug. 1922, pp. 65-78, 43 figs. Presents drawings of 39 types of standard cars and underframes for broad and meter-gage railways of India.

CARS, COAL

Gondola. Method Used in Designing C. M. & St. P. Gondola Car. Ry. Mech. Engr., vol. 96, no. 11, Nov. 1922, pp. 639-644, 16 figs. partly on p. 638. Analysis of factors of design and loading and calculation of stresses in underframe and body.

CARS, FREIGHT

Composite Box. The Design of a Modern 40-Ton Capacity Composite Box Car. Ry. Rev., vol. 71, no. 17, Oct. 21, 1922, pp. 545-554, 12 figs. Method of determining stresses and structural details illustrated in construction of new car of C. M. & St. P.

Container System. Recent Developments in Use of Container Cars, F. S. Gallagher. Ry. Age, vol. 73, no. 19, Nov. 4, 1922, pp. 833-835, 4 figs. Saving in manual handling by container system; application to transportation of milk in bulk. Describes use of L. C. L. containers. Address before Soc. Terminal Engrs.

Steel. Design of Steel Freight Car Equipment, John A. Pilcher. Ry. Club of Pittsburgh, vol. 21, no. 8, Sept. 28, 1922, pp. 163-176 and (discussion) 176-182. Design and operation from viewpoints of owner and user, transportation or operating department, claim department, car builders, and manufacturers and sellers of specialties. See also Ry. Mech. Engr., vol. 96, no. 11, Nov. 1922, pp. 633-637, 1 fig.

CARS, PASSENGER

Dining. New Pullman Dining and Buffet Cars. Ry. Gaz., vol. 37, no. 15, Oct. 13, 1922, pp. 447-450, 9 figs. partly on p. 453. Constructed by Midland Railway-Carriage & Wagon Co., Ltd., Birmingham, England, for Caledonian and L. B. & S. C. Railways.

Pennsylvania System Dining Cars Built at Altoona. Ry. Age, vol. 73, no. 20, Nov. 11, 1922, pp. 889-891, 4 figs. Attractive interior finish, kitchen equipment, and cast-steel truck side frames are features of design.

Restaurant and Sleeping Cars for the Siamese State Railways. Ry. Engr., vol. 43, no. 513, Oct. 1922, pp. 383-386, 12 figs. partly on pp. 387-388. General features of cars built by Cravens Ry. Carriage & Wagon Co., Ltd., Sheffield.

Sleeping, Steel. New Rolling-Stock for the International Sleeping-Car Company. Ry. Gaz., vol. 37, no. 19, Nov. 10, 1922, pp. 576-579, 6 figs. Describes all-steel sleeping cars under construction at Leeds Forge Co. for French railway; 40 on order.

CARS, REFRIGERATOR

French. Tests and Technical Measurements of Railway Cars Employed in France for Supplying the Troops with Frozen Meat (Versuche und technische Messungen an Eisenbahnwagen, die in Frankreich zur Versorgung der Truppen mit Gefrierfleisch eingerichtet wurden), H. Benard. Zeit. für die gesamte Kälte-Industrie, vol. 29, nos. 1, 2 and 4, Jan., Feb. and Apr. 1922, pp. 1-8, 17-22 and 68-73, 3 figs. Jan.: Calculations and experimental determination for adoption of insulating layer of cork and peat 0.15 m. thick having a heat-conductivity coefficient of about 0.06. Feb.: Determination of average heat-transmission coefficient of walls of cars. Apr.: Determination of heat-transmission coefficient of the various insulating materials. Translated from Révue générale du froid et des industries frigorifiques, Mar. 1921.

CASE-HARDENING

Compounds. Carbonex Case-Hardening Compounds. Engineering, vol. 114, no. 2965, Oct. 27, 1922, p. 532. Describes compound in form of paste which does away with necessity for box, and of special furnace, for by its use, it is possible to case-harden ordinary objects in blacksmith's fire.

CAST IRON

Testing. The Testing of Cast Iron, Francis W. Rowe. Metal Industry (Lond.), vol. 21, nos. 17 and 18, Oct. 27 and Nov. 3, 1922, pp. 395-396 and 421-424, 6 figs. Methods for estimation of total carbon, graphite carbon, combined carbon, sulphur, silicon, phosphorus, manganese and other constituents; physical testing, including compression and impact, and shearing strength.

CASTINGS

Gray-Iron. Grey Iron Castings—Their Chemical Analysis, Richard Moldenke. Can. Foundryman, vol. 13, no. 9, Sept. 1922, pp. 24-26. Recent tendencies in gray-iron foundry practice.

Production Methods. Wonderful Business Developed During Panic, F. H. Bell. Can. Foundryman, vol. 13, no. 10, Oct. 1922, pp. 15-17 and 25, 8 figs. Describes new plant of Dominion Eng. Co., subsidiary of Dominion Bridge Co. and its method of producing castings.

Vertically Poured. Large Vertically Poured Castings, S. G. Smith. Foundry Trade Jl., vol. 26, no. 321, Oct. 12, 1922, pp. 296-297, 8 figs. Describes examples of important castings which are water pressure tested; they are chiefly poured with small runners from top.

CENTRAL STATIONS

Economy of Small Power Plants vs. Facts About Coal Conservation, Egbert Douglas. Indus. Management (N. Y.), vol. 64, no. 5, Nov. 1922, pp. 296-300. Discussion of question as to whether central-station developments and superpower plans are in line with real economy.

High Pressure and Superheat in. The Commercial Economy of High Pressure and High Superheat in the Central Station, Geo. A. Orrok. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 706-708, 2 figs. Notes on commercial limits of pressure and superheat in central station; variation of strength of materials with temperature. It is shown that pressures up to 1200-1500 lb. are commercial and may be obtained without serious difficulty; temperatures are commercial up to 700-750 deg., which should not be exceeded until materials for valves and superheaters are improved.

Superpower. A French Super-Station. Electrician, vol. 89, no. 2316, Oct. 6, 1922, pp. 382-388, 7 figs. Discusses electricity supply of Paris and how Gennevilliers station will solve them, including layout, civil-engineering work, boiler plants, turbines, auxiliary plant, alternators, 60,000-volt distributing vault.

CHAIN DRIVE

Efficiency. Efficiency of Chain Drives, G. M. Bartlett. Machy. (N. Y.), vol. 29, no. 3, Nov. 1922, pp. 169-173, 7 figs. Original analysis of chain and sprocket action. Low numbers of teeth and incorrect center distances as causes of appreciable variations in angular velocity and reduction in efficiency.

CHARTS

Calculating. A New Calculating Chart, E. L. Rice. Jl. Indus. & Eng. Chem., vol. 14, no. 11, Nov. 1922, pp. 1032-1036, 2 figs. Presents new chart together with rules for its use and examples of its application in various branches of mathematics.

COAL

Ash Fusibility. Fusibility of Ash from Coals of the United States, W. A. Selvig and A. C. Fieldner. U. S. Bur. of Mines, Bul. no. 209, 1922, 119 pp., 6 figs. General survey of "fusing" or "softening" temperatures. Includes table giving softening temperatures of coal ash from coals of United States and table giving comparison of softening temperatures of coal ash from mine and car samples.

COAL HANDLING

Conveyors. Reducing the Cost of Handling Coal, J. M. Kelly. Coal Industry, vol. 5, no. 10, Oct. 1922, pp. 437-438, 2 figs. Statistics showing saving of cost of handling bulk material by use of better belt conveyor idlers.

Hydraulic Conveying. Hydraulic Conveying of Coal. Indus. Management (Lond.), vol. 8, no. 8, Nov. 2, 1922, pp. 257-258, 2 figs. Describes new pump for conveyance of gravel, coal and ashes, and all kinds of fibrous substances.

Locomotive Plants. Locomotive Coal and Ash-Handling Plant at Crewe. Engineering, vol. 114, no. 2965, Oct. 27, 1922, pp. 511-515, 41 figs. partly on p. 526 and supp. plate. Describes plant of Lond. & North-Western Ry., consisting of reinforced-concrete bunker raised sufficient height above rail level for coal to be fed to locomotives by gravity, and gear provided for dumping coal into bunker or hopper.

The Latest Locomotive Coal and Ash Handling Plants of the London and North-Western Railway Co., George F. Zimmer. Indus. Management (Lond.), vol. 8, no. 7, Oct. 19, 1922, pp. 227-232, 5 figs. Details of coal and ash-handling devices built by Mitchell Conveyor & Transporter Co., Ltd., London.

Portable Bucket Elevators. The Handling of Fuels (Die Stapelung von Brennstoffen), Hubert Hermanns. Feuerungstechnik, vol. 11, no. 1, Oct. 1, 1922, pp. 4-6, 4 figs. Describes improvements in portable bucket elevators, etc., developed by firm of Heinzelmann & Sparmberg, Hannover.

COKE

Foundry. Coke and Its Influence in the Foundry (Ueber Koks und seinen Einfluss in der Giesserei), Heinrich Koppers. Giesserei-Zeitung, vol. 19, no. 42, Oct. 24, 1922, pp. 613-617, 9 figs. Composition of coked fuels; combustion processes in blast furnace and foundry shaft furnace; influence of coke on cast iron; combustibility of coke an important factor; recommendations for modern shaft furnaces.

COKE-OVEN GAS

By-Products from. Ford Principles and Practice at River Rouge, John H. Van Deventer. Indus. Management (N. Y.), vol. 64, no. 5, Nov. 1922, pp. 280-287, 13 figs. By-products from coke-oven gases.

COLD STORAGE

Insulating System. New System of Insulating Cold-Storage Rooms (Nouveau système d'isolement des chambres froides). Bul. Technique du Bureau Veritas, vol. 4, no. 8, Aug. 1922, pp. 185-186, 3 figs. Discusses new system by Pohlmann depending upon use of air spaces.

Thermometer Lag. Thermometer Lag in Cold Storage Practice, Ezer Griffiths and J. H. Awbery. Engineering, vol. 114, no. 2964, Oct. 20, 1922, p. 508, 6 figs. Investigation of errors which may arise in measuring temperature of atmosphere in ship's hold, and time lags likely to arise with rapidly changing temperatures. (Abstract.) Paper read before Faraday Soc.

Warehouse Plants. Montreal Cold Storage Warehouse Plant. Power House, vol. 15, no. 20, Oct. 20, 1922, pp. 21-27, 15 figs. Describes new plant consisting of two buildings for refrigeration of food products pending shipment abroad; equipment of plant, power house, etc.

COMPRESSED AIR

Applications. Some Modern Applications of Compressed Air, F. A. McLean. Can. Engr., vol. 43, no. 19, Nov. 7, 1922, pp. 522-524, 7 figs. Survey of air tools used in contracting and construction work; labor-saving feature; construction costs reduced; description of various classes of work where air tools are used.

Pneumatic Mail Tubes. Pneumatic Mail Tubes and Operation of Automatic Railroads, Kenneth E. Stuart. Engrs. & Eng., vol. 39, no. 10, Oct. 1922, pp. 337-343, 3 figs. Describes carriers, receiver, transmitter, etc. of pneumatic mail tubes which were in use in Philadelphia, also automatic railway as substitute for automobiles running from Paddington to White chapel, Lond., for carrying mail; automatic control of trains.

CONDENSERS, STEAM

Ejectors. The Gaseous Fluid Ejector, Henry A. Hepburn. Engineer, vol. 134, nos. 3486 and 3487, Oct. 20 and 27, 1922, pp. 401-402 and 429-430, 7 figs. Writer presents various factors in new light, which shows clearly relationship between fundamentals of problem and gives opportunity of forecasting design of more efficient types of ejector apparatus.

Surface. Surface Condensing Plant and Auxiliaries. Engineer, vol. 134, no. 3486, Oct. 20, 1922, pp. 403-406, 13 figs. partly on p. 414. Describes Allen condensing plant at power station in Chelsea, England, with details of Allen steam-jet air, rotary extraction and turbine-driven circulating pumps.

CONNECTING RODS

Explosion Engines. Connecting Rods of High-Speed Explosion Engines, Especially for Aviation (Étude sur les bielles de moteurs à explosions à grande vitesse et plus particulièrement de moteurs d'aviation), C. Bourcier. Arts et Métiers, vol. 75, no. 24, Sept. 1922, pp. 257-259, 4 figs. Stresses in main and secondary connecting rods

CONVEYORS

Factories. Individual and Collective Conveying in Shop Operations (Die Einzel- und Massenbeförderung in Werkstättenbetrieben), Wintermeyer. Fördertechnik u. Frachtverkehr, vol. 15, no. 21, Oct. 13, 1922, pp. 271-273, 8 figs. Discusses hoisting and conveying appliances of various types.

COPPER ALLOYS

Copper-Tin. The Electrolytic Separation of Copper-Tin Alloys (Ueber die elektrolytische Scheidung von Kupfer-Zinn-Legierungen), Paul Weise. Zeit. für Elektrochemie, vol. 28, no. 15-16, Aug. 1, 1922, pp. 327-341, 2 figs. Attempt is made to conduct process of separation in such a way that only copper goes in solution, whereas the entire content of tin remains in the anode slime, so that pure anode copper is obtained.

CORE OVENS

Heat Loss. Study Core Oven Heat Loss, C. F. Mayer. Foundry, vol. 1, nos. 20 and 21, Oct. 15 and Nov. 1, 1922, pp. 839-843 and 885-889, 18 figs. Tests made on two electrically heated and one oil-fired core oven. Results analyzed to determine efficiency of ovens and relative heating costs. Paper presented at Am. Foundrymen's Assn.

CORROSION

Preventive Apparatus. Corrosion—Apparatus to Prevent It. Power, vol. 56, no. 19, Nov. 7, 1922, pp. 728-730, 4 figs. Describes two types of deaerators, the Contraflo and the Cochrane vacuum deaerating heater.

Protective Paints and Varnishes. Examination of Varnishes and Paints As to Their Protection Against Rusting (Untersuchungen verschiedener Firnisse und Anstrichfarben unter Berücksichtigung ihrer rostschützenden Eigenschaft), Maass and Junk. Zeit. für angewandte Chemie, vol. 35, nos. 54 and 55, July 7 and 11, 1922, pp. 353 and 360-362. Reviews substitutes worked out during war for varnishes; results of investigations covering testing of three classes of varnish and three classes of paint.

COST ACCOUNTING

Drop Forging. Symposium on Cost Accounting. Forging & Heat Treating, vol. 8, no. 10, Oct. 1922, pp. 471-473. Record of discussion at convention of Am. Drop Forging Inst. lead by members of Cost Committee.

Factory. The Development of Scientific Industrial Organization in Germany, G. Schlesinger. Mech. Eng. vol. 44, no. 11, Nov. 1922, pp. 704-705. Deals with development of cost-accounting systems in Germany. Notes on progress through theoretical investigation; German industrial attitude. Seven theses for discussion, in debate before Research Society for Scientific Management.

Inventory Taking. Organizing for Taking Inventory, O. C. Kiehne. Iron Trade Rev., vol. 7 no. 17, Oct. 26, 1922, pp. 1125-1127. Points out th modern methods of accounting make physical

* Engberg's Electric & Mech. Wks
* Erie City Iron Works
* Leffel, James & Co.
* Murray Iron Works Co.
* Troy Engine & Machine Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Murray Iron Works Co.
* Vilter Mfg. Co.

Engines, Steam, High Speed
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Vilter Mfg. Co

Engines, Steam, Throttling
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Murray Iron Works Co.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
Harrisburg Foundry & Machine Works
* Ridgway Dynamo & Engine Co.
Stumpf Una-Flow Engine Co. (Inc.)

Engines, Steam, Variable Speed
* Brownell Co.

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Farrel Foundry & Machine Co.
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Flory, S. Mfg. Co.
Lidgerwood Mfg. Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
Clarage Fan Co.

Exhausters, Gas
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Expansion Joints
(See Joints, Expansion)

Extractors, Centrifugal
Tolhurst Machine Works

Extractors Oil and Grease
Curtis Machine Co.
* Kielev & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Machinery Co.

Fans, Exhaust, Mine
Clarage Fan Co.

Feed Water Circulators, Heaters, Heaters and Purifiers, etc.
(See Circulators, Heaters, Heaters and Purifiers, etc., Feed Water)

Feed Water Controllers
(See Regulators, Feed Water)

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Smidth, F. L. & Co.

Filters, Gravity
* Permutit Co.

Filters, Mechanical
* Loomis-Manning Filter Distributing Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Loomis-Manning Filter Distributing Co.
* Permutit Co.

Filters, Water
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Loomis-Manning Filter Distributing Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Loomis-Manning Filter Distributing Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fire Tube Boilers
(See Boilers, Return and Vertical Tubular)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
Martin-Morse Corp'n
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
Martin-Morse Corp'n
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc. (Reading Valve & Fittings Division)
* United States Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Hydraulic Press Mfg. Co.
* Reading Steel Casting Co. (Inc (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Manhole
* Glasgow Iron Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
Martin-Morse Corp'n
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.
Weatherly Foundry & Mfg. Co.

Fittings, Steel
* Crane Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Flanges
* American Spiral Pipe Works
* Crane Co.
* Glasgow Iron Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Flanges, Pressed Steel
* Glasgow Iron Co.

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Co.
* Murray Iron Wsrks Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Furnace & Burner Corp'n

Forgings, Alloy Steel
* American Forge & Machine Co.

Forgings, Drop
* American Forge & Machine Co.
* Vogt, Henry Machine Co.

Forgings, Hammered
Nilson-Miller Co.

Forgings, Heavy
* American Forge & Machine Co.

Forgings, Iron & Steel
* American Forge & Machine Co.
Nilson-Miller Co.

Forgings, Steel
* American Forge & Machine Co.

Forming Machines, Hydraulic
* Hydraulic Press Mfg. Co.

Foundry Equipment
Northern Engineering Works

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnace Linings
(See Linings, Furnace)

Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Kenworthy, Chas. F. (Inc.)

Furnaces, Forging
Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.

Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
* Johns-Manville (Inc.)

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Glasses
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Gages, Ball
* Atlas Ball Co.
* S K F Industries (Inc.)

Gages, Differential Pressure
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Draft
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Hydraulic Press Mfg. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Liquid Level
* Bristol Co.
* Lunkenheimer Co.
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
* Atlas Ball Co.
Nilson Miller Co.
* Norma Co. of America
* S K F Industries (Inc.)

Gages, Pressure
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)

ventories unnecessary except for determining accuracy of accounting procedure; best to create temporary organization of department heads; counting and checking started in advance. (Abstract.) Paper prepared for Indus. Cost Assn.

COSTS

Relation to Selling Price. Production Costs and Selling Price During a Depression, Wallace Clark. Taylor Soc. Bul., vol. 7, no. 4, Aug. 1922, pp. 128–130, 2 figs. Points out that when there is plenty of work ahead, prices should be quoted which will produce profits, but when there is little work to be had, prices should be quoted which will reduce losses.

COUPLINGS

Flexible. Flexible Couplings. Machy. (Lond.), vol. 21, no. 524, Oct. 12, 1922, pp. 33–35, 4 figs. Where and how they should be used.

CRANES

Electric. 10-Ton Electric Overhead Travelling Crane. Engineering, vol. 114, no. 2966, Nov. 3, 1922, pp. 553–554, 3 figs. partly on p. 556. Details of cranes recently constructed for Pekin-Mukden Ry. Co. of China, each having span of 40 ft. and lifting capacity of 10 tons.

Steam Revolving. Standard Steam Revolving Cranes (Normale Dampfdrehkrane), H. Kessner and H. Benedict. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 41, Oct. 12, 1922, pp. 965–968, 17 figs. Notes on design, with special reference to control arrangements for lifting, traversing and luffing gear; various fields of usefulness; standardization of separate parts.

CRANKSHAFTS

Grinding. Crankshaft Grinding. British Machine Tool Eng., vol. 2, no. 17, Sept.-Oct. 1922, pp. 535–540, 10 figs. Discusses finishing of single and multi-throw crankshafts on precision grinding machine.

CUPOLAS

Design and Types. Foundry Cupolas, E. A. Roper. Foundry Trade Jl., vol. 26, no. 322, Oct. 19, 1922, pp. 321–323, 2 figs. Notes on reducing cupola chimneys; drop bottoms; blast volume and pressure; tuyeres; cupola wells. Discussion of cupola types.

Lining. A New Cupola Lining. Iron Age, vol. 110, no. 20, Nov. 16, 1922, p. 1279. Describes patented adjustable liner rings in place of usual block patterns which may be either solid or split, and which are moved upward in cupola as ramming up lining proceeds. Translated from article in Giesserei by Karl Crocholl, inventor of patent.

CUTTING TOOLS

Diamond. Diamond Tools as Cost Reducers. Machy. (Lond.), vol. 21, no. 526, Oct. 26, 1922, pp. 108–111, 7 figs. Use of diamonds for cutting various materials; preparation of diamond; economies introduced by application as manufacturing tools.

D

DIES

Compound. Combination Piercing, Blanking and Forming Dies, C. J. Dorer. Am. Mach., vol. 57, no. 17, Oct. 26, 1922, pp. 649–654, 4 figs. Construction and operation of two dies which replaced four; safety features taken care of; wearing parts easily replaced and adjusted.

DIESEL ENGINES

Care and Maintenance. The Care and Maintenance of Diesel Engines, George E. Windeler. Engineer, vol. 134, nos. 3487 and 3488, Oct. 27 and Nov. 3, 1922, pp. 447–448 and 478–479, 5 figs. Deals with important points in running of engines. (Abstract.) Paper read before Diesel Engine Users' Assn.

Exhaust-Gas Utilization. Recovery of Heat from Diesel-Engine Exhaust Gases. Mar. Engr. & Naval Architect, vol. 45, no. 541, Oct. 1922, pp. 391–392, 2 figs. Land and marine installations contrasted. System adopted in oil-tank vessels; service conditions.

DRILLING MACHINES

Gang. Gang Drilling Machine. Machy. (Lond.), vol. 21, no. 526, Oct. 26, 1922, pp. 114–117, 8 figs. Heavy-duty manufacturing machine for repetition drilling of articles required in moderately large quantities. Developed by J. Archdale & Co., Birmingham, England.

Multiple-Spindle. Multiple-spindle Drilling Machine. Machy. (Lond.), vol. 21, no. 527, Nov. 2, 1922, pp. 135–137, 5 figs. Describes machine representing new line of development of J. Archdale & Co., Birmingham, England, and intended for rapidly drilling number of holes simultaneously in light work.

DROP FORGING

Industry, Growth of. The Drop Forging Industry, F. A. Ingalls. Forging & Heat Treating, vol. 8, no. 10, Oct. 1922, pp. 458–462 and (discussion) 462–464. Recounts growth of industry from technical and commercial viewpoints; compares departmental and commercial forge shops; urges importance of cooperation. Paper read before Am. Drop Forging Inst.

DROP HAMMERS

Operating Cost. Power Plant Cost of Operating Hammers, R. E. Waldron. Forging & Heat Treating, vol. 8, no. 10, Oct. 1922, pp. 474–476, 4 figs. Causes of variation in steam consumption; steam consumption per hour for various-size hammers; basis of comparison for steam costs; labor and overhead in boiler house charges. Paper read before Am. Drop Forging Inst.

DRYING PLANTS

Vacuum. New Vacuum Drying Plant. Chem. Trade Jl. & Chem. Engr., vol. 71, no. 1847, Oct. 13, 1922, pp. 451–452, 1 fig. Plant consists of (1) air-tight drying tank, in which paste or articles to be dried are placed, (2) barometric jet condenser where gases from articles to be dried are condensed, (3) Delas air extractor for purpose of producing and maintaining vacuum in tank and condenser. Built by Société Condenseurs Delas.

DUST

Removal. Industrial Hygienic Plants for Protection against Dust, Smoke, Vapors, Heat, etc. (Gewerbehygienische Anlagen zum Schutze gegen Staub, Rauch, Dämpfe, Hitze u.a.m.), L. Aretz. Gesundheits-Ingeneiur, vol. 45, no. 39, Sept. 30, 1922, pp. 493–498, 19 figs. Describes modern arrangements for removing dust, etc., in ore-dressing and coal screening plants, cement works, crushing plants, briquetting works, metallurgical works, woodworking industry and textile and paper industry.

Sampling Instrument. A New Instrument for Sampling Aerial Dust, Leonard Greenburg and George W. Smith. U. S. Bur. of Mines Reports of Investigations, no. 2392, Sept. 1922, 3 pp. Describes apparatus, devised by authors, making use of principle of impingement of dust-laden air at high velocity on wetted glass surface, together with that of bubbling air through liquid medium. It consists of hand pump or electrically operated blower, a flow meter, and dust-collecting device.

E

ECONOMIZERS

Steel. Ideas on Steel Economizers (Quelques idées sur les économiseurs en acier), H. Dieterlen. Chaleur et Industrie, vol. 3, nos. 28, 29 and 30, Aug., Sept. and Oct. 1922, pp. 1515–1521, 1603–1607 and 1681–1688, 29 figs. partly on supp. plates. Aug.: Discusses question of economizers such as are being used at Gennevilliers and other power plants. Sept.: Exterior corrosion; temperature of feedwater and walls; applications of Dieterlen economizer. Oct.: Discusses corrosion caused by wet steam and how to eliminate it.

EDUCATION, ENGINEERING

Future Problem. Preparing the Engineer for the New Era, John H. Dunlap. Eng. Education, vol. 13, no. 2, Oct. 1922, pp. 48–64. Specifications for future preparation of engineer.

ELECTRIC DRIVE

Tanneries. Electric Drive in Tanneries, J. A. Horne. Gen. Elec. Rev., vol. 25, no. 10, Oct. 1922, pp. 618–624, 9 figs. Describes electric drive of two tanneries, one operating by vegetable process and other by chrome process showing ready adaptability of electric motor.

ELECTRIC FURNACES

Ajax-Wyatt. The Ajax-Wyatt Furnace in the Brass Mill Casting Shop, Russell P. Heuer. Il. Indus. & Eng. Chem., vol. 14, no. 11, Nov. 1922, pp. 1021–1024, 3 figs. Describes construction, casting equipment and application. Develops method of bringing furnace into better electrical balance. Investigates operating characteristics of improved furnace and compares performance with that of coal-fired crucible furnace.

Aluminum-Melting. New English Electric Furnace, A. Glynne Lobley. Metal Industry (N. Y.), vol. 20, no. 10, Oct. 1922, pp. 386–387, 1 fig. Describes simple electric crucible furnace for melting aluminum.

Arc, Regulator for. A New Regulating Arrangement for Electric Arc Furnaces (Eine neue Regeleinrichtung für elektrische Lichtbogenöfen), E. Fr. Russ. Giesserei-Zeitung, vol. 19, no. 39, Oct. 3, 1922, pp. 575–577, 3 figs. Details and useful possibilities of the Arca electrode regulator.

Electrode Design. Changes Design of Electrodes, G. Vitali. Foundry, vol. 50, no. 19, Oct. 1, 1922, pp. 799–800, 2 figs. New furnace in steel plant of Fiat corporation in Turin, Italy has sealed electrodes to prevent oxidation through contact with air. Lower voltage employed for refining operation. Translated from Stahl u. Eisen.

Steel. The Electric Steel Furnace System "Elektrometall" (Der Elektro-Stahlofen System "Elektrometall"), Assar Grönwall and Felix Horschitz. Elektrotechnik u. Maschinenbau, vol. 40, no. 42, Oct. 15, 1922, pp. 485–487, 6 figs. Describes new steel furnace developed by Grunwall, Lindblad and Stalhane in Sweden, its electric equipment and operation.

Use, Expansion of. Use of Electric Furnace Expands, John A. Mathews. Iron Trade Rev., vol. 71, no. 18, Nov. 2, 1922, pp. 1203–1205. Half of world's furnaces in United States; Italy ranks second. Causes of expansion. (Abstract.) Paper presented before Am. Iron & Steel Inst. See also Blast Furnace & Steel Plant, vol. 10, no. 11, Nov. 1922, pp. 542–544.

ELECTRIC LOCOMOTIVES

Design. Electric Locomotives, Vincent L. Raven. Instn. Mech. Engrs.—Proc., no. 4, June 1922, pp. 735–774 and (discussion) 774–781, 19 figs. Deals with general questions of (1) requirements which locomotive must be designed for, (2) various designs worked out to meet these requirements, and (3) advantages and disadvantages of various designs. Deals with shunting, freight and passenger locomotives.

Paris-Orleans Railway, France. Paris-Orleans Railway Begins Electrification Program, A. H. Candee and L. E. Lynde. Ry. Rev., vol. 71, no. 20, Nov. 11, 1922, pp. 662–663. Purchase 200 locomotives from French firms for initial electrification; dimensions and other particulars of electric locomotives.

ELECTRIC RAILWAYS

Switching Systems. Connection Systems in the Transmission-Line Installations of the Swiss Federal Railway (Schaltanordnungen in den Fahrleitungs-Anlagen der Schweizerischen Bundesbahnen), H. W. Schuler. Schweizerische Bauzeitung, vol. 80, no. 16, Oct. 14, 1922, pp. 175–178, 7 figs. Describes systems adopted on Thun-Berne, Lucerne-Chiasso, Sihlbrugg-Zurich, Sitten-Lausanne and Lucern Basel sections.

Systems. Report of Committee on Heavy Electric Traction, Association of Railway Electrical Engineers Thirteenth Annual Convention. Ry. Elec. Engr., vol. 13, no. 10, Oct. 1922, pp. 333 and 339. Gives tabulation of data relating to electrified systems of North and South America.

ELECTRIC RAILWAYS, TRACK

Rebuilding. Excavating Track in Chunks with a Derrick, R. C. Ram. Elec. Ry. Jl., vol. 60, no. 19, Nov. 4, 1922, pp. 735–738, 10 figs. Describes replacing of solid concrete construction with steel ties and granite block pavement by wood-tie construction and sheet-asphalt pavement in Fulton Street, Brooklyn.

ELECTRIC WELDING, ARC

Automatic. Automatic Arc Welding, A. K. West. Am. Mach., vol. 57, no. 20, Nov. 16, 1922, pp. 753–754, 4 figs. Applications of process at Gen. Elec. Co.'s Schenectady plant; manufacturing solenoid brake wheels; seam welding; repairing armature shafts.

Cast Iron. Arc Welding of Cast Iron, W. H. Namack. Am. Welding Soc. Jl., vol. 1, no. 8-9, Aug.-Sept. 1922, pp. 47–71, 13 figs. Notes on carbon arc welding; metallic arc welding; use of steel studs; the Allard and Holslag methods of welding cast iron. Bibliography. Report of sub-committee of Northern N. Y. Section of Am. Welding Soc.

Developments. Electric Arc Welding (La soudure electrique a l'arc), R. Verdier. Nature (Paris), no. 2530, Sept. 30, 1922, pp. 215–220, 12 figs. Historic developments; Zerener process; Kjellberg process; making of welds; effect of different kinds of current used in electric welding in steel foundries.

ELECTRIC WELDING, RESISTANCE

Methods and Apparatus. Resistance Welding, A. L. De Leeuw. Am. Mach., vol. 57, no. 19, Nov. 9, 1922, pp. 721–724, 7 figs. Notes on methods of welding; current required for electric welding; principles of apparatus.

EMPLOYEES

Arousing Interest of. Selling the Institution to Its Own Personnel as Well as to the Public, Charles Pulford Bulkley. Indus. Management (N. Y.), vol. 64, no. 5, Nov. 1922, pp. 278–279. Points out importance of making employees see that they are working not primarily to make dividends for other men, but for an institution that is recognizedly of universal service.

EMPLOYMENT MANAGEMENT

Employment Bureau. The Employment Bureau. Eng. Production, vol. 5, no. 108, Oct. 26, 1922, pp. 388–390, 7 figs. Consideration of its important functions.

Performance Ratings and Bonuses. Performance Ratings and Bonuses for Salaried Employees, Howard G. Benedict. Taylor Soc. Bul., vol. 7, no. 4, Aug. 1922, pp. 142–152. Describes rating by elements and gives bulletin illustrating elements used for rating qualifications of first-class man in general, to which are appended requirements of specific jobs.

ENAMELING

Cast Iron. Wet Process Enamels for Cast Iron, R. R. Danielson and H. P. Reinecker. Am. Ceramic Soc. Jl., vol. 5, no. 10, Oct. 1922, pp. 647–669. Results of investigations on effect of varying composition and treatment on wet-process enamels; develops number of satisfactory enamels and gives information on technical side of this type of enameling.

ENGINEHOUSES

Erie R. R., Jersey City. Erie Builds New Enginehouse at Jersey City, N. J. Ry. Age, vol. 73, no. 20, Nov. 11, 1922, pp. 877–881, 8 figs. Old structure is replaced without interference with locomotive operations. New building is combination of radial type 105-ft. enginehouse and rectangular building.

ENGINEERS

Classification and Remuneration. Report of Committee on Classification and Remuneration of Engineers. Eng. Jl. (Eng. Inst. Can.), vol. 5, no. 11, Nov. 1922, pp. 541–544, 1 fig. Published by authority of Council for information of members of Institute with view to discussion and consideration by branches regarding its adoption by Institute.

EXHAUST STEAM

Commercial Value. Commercial Value of Exhaust Steam, Fred W. Bosch. Power Plant Eng., vol. 26, nos. 20 and 21, Oct. 15 and Nov. 1, 1922, pp. 997–999 and 1047–1048, 3 figs. Notes on exhaust steam required for feedwater heating; heating value of exhaust steam shown by indicator diagrams. Enlargement of article by A. Langstaff Johnston, Jr.

* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gages, Water Level
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gas Analysis Apparatus
* Precision Instrument Co. (Inc.)

Gas Burners, Compressors, Engines, Exhausters, Producers, etc.
(See Burners, Compressors, Engines, Exhausters, Producers etc., Gas)

Gas Collectors
* Precision Instrument Co. (Inc.)

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gasoline
Texas Co.
* Tide Water Oil Sales Corp'n

Gates, Sluice
* Chapman Valve Mfg. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.

Gears, Cut
Brown, A. & F. Co.
* De Laval Steam Turbine Co
* Farrel Foundry & Machine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co
Hindley Gear Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Mackintosh-Hemphill Co.
* Medart Co.
Nilson-Miller Co.
Northern Engineering Works
* Toledo Machine & Tool Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Grinding
* Farrel Foundry & Machine Co.

Gears, Helical
* Farrel Foundry & Machine Co.

Gears, Herringbone
* Farrel Foundry & Machine Co.

Gears, Machine Moulded
Brown, A. & F. Co.
* Farrel Foundry & Machine Co.
* Jones, W. A. Fdry. & Mch. Co.

Gears, Rawhide
* Farrel Foundry & Machine Co.
* James, D. O. Mfg. Co.

Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Farrel Foundry & Machine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.

Gears, Worm
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co
* Gifford-Wood Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co
Nilson-Miller Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks
* General Electric Co.
* Kerr Turbine Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks
* General Electric Co.
* Ridgway Dynamo & Engine Co

Governors, Air Compressor
* Foster Engineering Co.

Governors, Engine, Gas
Massey Machine Co.

Governors, Engine, Oil
Massey Machine Co.

Governors, Engine, Steam
Massey Machine Co.

Governors, Gas
Equitable Meter Co.

Governors, Oil Burner
* Foster Engineering Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Davis, G. M. Regulator Co
* Foster Engineering Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)

Governors, Steam Turbine
* Foster Engineering Co.

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co.

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave Brooks Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* McClave Brooks Co.
* Vogt, Henry Machine Co.

Grates, Kiln
* McClave Brooks Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave Brooks Co.
* Springfield Boiler Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
Dixon, Joseph Crucible Co.
* Royersford Foundry & Machine Co.
Texas Co.
* Tide Water Oil Sales Corp'n
Vacuum Oil Co.

Grinding Machinery
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Foundry & Machine Co.

Grinding Machines, Internal
* Heald Machine Co.

Grinding Machines, Surface
* Heald Machine Co.

Guards (Electric Lamps)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Bliss, E. W. Co.
* Franklin Machine Co.
Long & Allstatter Co.
* Toledo Machine & Tool Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hangers, Shaft
Brown, A. & F. Co.
* Falls Clutch & Machinery Co
* Jones, W. A. Fdry. & Mach. Co
* Medart Co.
* Royersford Foundry & Machine Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball and Roller Bearing)
* Jones, W. A. Fdry. & Mach. Co
* S K F Industries (Inc.)

Hardening
* American Metal Treatment Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

Heaters, Water Supply
Herbert Boiler Co.

Heaters, Water Supply (Garbage Burner)
Herbert Boiler Co.

Heaters & Mixers, Water, Instantaneous
Manufacturing Equipment & Engrg. Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.
* Erie City Iron Works
* H.S.B.W.-Cochrane Corp'n
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water Metering
* H.S.B.W.-Cochrane Corp'n

Heating Systems, Vacuum
* Illinois Engineering Co.

Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
Clarage Fan Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.

Hoisting Machinery
Mundy, J. S. Hoisting Engine Co

Hoists, Air
* Ingersoll-Rand Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.

Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n

Hoists, Electric
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Flory, S. Mfg. Co.
* General Electric Co.
* Gillis & Geoghegan
Lidgerwood Mfg. Co.
Mundy, J. S. Hoisting Engine Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Electric Crane & Hoist Co.

Hoists, Friction
Brown Clutch Co.
Eastern Machinery Co.

Hoists, Gas and Gasoline
Flory, S. Mfg. Co.
Lidgerwood Mfg. Co.
Western Machinery Co.

Hoists, Gasoline
Mundy, J. S. Hoisting Engine Co.

Hoists, Hand Power
* Gillis & Geoghegan

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Mine
Flory, S. Mfg. Co.
Lidgerwood Mfg. Co.
Mundy, J. S. Hoisting Engine Co.
Western Machinery Co.

Hoists, Skip
* Beaumont, R. H. Co.
* Brown Hoisting Machinery Co.
Flory, S. Mfg. Co.
Lidgerwood Mfg. Co.
Otis Elevator Co.

Hoists, Steam
(See Engines, Hoisting)

Hoists, Telescopic
* Gillis & Geoghegan

Holders, Nipple
Curtis & Curtis Co.

Hose, Metallic
* Johns-Manville (Inc.)

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n

Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Worthington Pump & Machinery Corp'n

Hydraulic Machinery
* Allis-Chalmers Mfg. Co.
Hydraulic Press Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Rams, Presses, Turbines, etc.
(See Rams, Presses, Turbines, etc., Hydraulic)

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
Taylor Instrument Cos.

Hygrometers
Taylor Instrument Cos.

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Gifford-Wood Co.

Idlers (Lenix)
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Indicators, CO_2
Bacharach Industrial Instrument Co.
Brinckerhoff, H. Gordon Co.
* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.

Indicators, Engine
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Utilization. Utilization of Waste Steam in the Railroad Shops at Cassel (Anlage zur Verwertung des Abdampfes in der Eisenbahnhauptwerkstätte Kassel-Verschiebebahnhof), H. Bartels. Organ für die Fortschritte des Eisenbahnwesens, no. 14, July 15, 1922, pp. 205–209, 3 figs. Discusses applications of waste steam for heat, hot water, drying, preheating feedwater, etc., and describes some apparatus.

F

FACTORIES

Layout and Equipment. A Model Factory. Eng. Rev., vol. 36, nos. 1 and 2, July and Aug. 1922, pp. 8–10 and 45, 3 figs. Describes Greenford factory of J. Lyons & Co. especially arrangements in handling and conveying tea from the barges to the finished packages; short account of boiler house and power plant.

FEEDWATER HEATERS

Locomotive. Feed-Water Heaters for Locomotives Edouard Sauvage. Instn. Mech. Engrs.—Proc. no. 4, June 1922, pp. 715–726 and (discussion) 727–734, 9 figs. Discusses different types Davies and Metcalfe injector, Caille-Potonié, Worthington and Knorr heaters. Advantages and suggestions for use.

Test Code, A.S.M.E. Test Code for Feedwater Heaters. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 759–760 and 765. Preliminary draft of seventh in series of nineteen test codes being formulated by A.S.M.E. committee on power test codes.

FILTERS

Oil and Fuel. Points to Remember in Designing Oil and Fuel Filters, J. B. Ferguson. Automotive Industries, vol. 47, no. 17, Oct. 26, 1922, pp. 818–820, 4 figs. Fundamentals underlying logical design of filtering systems.

FLIGHT

Gliding. The Rhön Gliding-Flight Competition (Der Verlauf des Rhön-Segelflug-Wettbewerbs 1922), Gerhard Gohlke. Luftfahrt, vol. 26, no. 9, Sept. 1922, pp. 123–128, 14 figs. Account of performances at competition, Aug. 9–24, 1922.

Synchronization of Records. The Synchronization of N.A.C.A. Flight Records, W. G. Brown. Nat. Advisory Committee for Aeronautics Tech. Notes, no. 117, Oct. 1922, 3 pp., 4 figs. Method is described for synchronizing different instrument records taken during flight testing.

FLUE-GAS ANALYSIS

CO_2 Content. The Carbonic-Acid Content of Flue Gas, Hourly Steam Output and Boiler Efficiency (Rauchgaskohlensäuregehalt, Stundenleistung und Wirkungsgrad), J. Hudler. Feuerungstechnik, vol. 11, no. 1, Oct. 1, 1922, pp. 1–4, 3 figs. It is shown that chimney loss is reduced through increase of CO_2 content of flue gas with unvarying hourly output, not only because of low flue-gas volume, but also because of low discharge temperature, and this is true to greater extent with water-rich than with dry fuels.

Graphic Method. Flue-Gas Analysis in Incomplete Combustion (Grafisk framställning av rökgasanalyser vid ofullständig förbränning), Axel Danielson. Teknisk Tidskrift, vol. 52, nos. 28 and 31, July 15, Aug. 5, 1922, pp. 449–451, 499–502, 7 figs. Discusses combustion, combustion products, quantity of air, and gives curves for graphic determination. Discusses incomplete combustion of coke.

Testing Apparatus. Flue-Gas Testers (Ueber Rauchgasprüfer), F. Otto H. Binder. Wärme- u. Kälte-Technik, vol. 24, no. 20, Oct. 15, 1922, pp. 233–235, 8 figs. Describes flue-gas scale known as Ökonometer, in which gases are weighed in order to determine their specific weight; and the Duplex-Mono and Union flue-gas tester for examination of flue gases.

Electric Flue-Gas Testers (Elektrische Rauchgasprüfer), Karl Stein. Wärme- u. Kälte-Technik, vol. 24, no. 20, Oct. 15, 1922, pp. 236–237, 3 figs. Describes system developed by Siemens & Halske.

Pocket-Size Gas Tester (Der Taschengasprüfer), H. Strache and K. Kling. Feuerungstechnik, vol. 11, no. 2, Oct. 15, 1922, pp. 13–15, 6 figs. New apparatus for dry examination of gas for determination of CO_2.

FLYING BOATS

Marcel Besson. The Marcel Besson Quadruplane Flying Boat. Aviation, vol. 13, no. 19, Nov. 6, 1922, p. 635, 1 fig. French giant flying boat which is to be used in passenger services over Mediterranean Sea. Span, 85 ft. 15 in.; length, 69 ft.; height, 23 ft.; width of float, 11 ft. 6 in.; four Salmson 250-hp. motors; speed, 80 m.p.h.

FLYWHEELS

Calculation. Error Due to Neglecting Electrical Forces in Calculating Flywheels for Reciprocating Machinery Driven by Synchronous Motors, A. R. Stevenson, Jr. Gen. Elec. Rev., vol. 25, no. 11, Nov. 1922, pp. 690–699, 5 figs. Discusses and illustrates correct method of flywheel calculation and verifies results by actual tests.

Safety Regulations. Flywheel Explosions and Their Prevention. Universal Engr., vol. 36, no. 4, Oct. 1922, pp. 30–31. Computation of stresses and suggestions for flywheel regulations on lines of boiler regulations; maximum speed for solid, link-jointed, flange-jointed and other cast-iron flywheels.

FORGE SHOPS

Heavy Forgings. Forge Shop Has New Provisions for Operating Economies, Herbert R. Simonds. Iron Trade Rev., vol. 71, no. 20, Nov. 16, 1922, pp. 1347–1350, 7 figs. Review of operating features of plant of Kropp Forge Co., Chicago, giving outline of modern practice in forging billets and blooms.

FORGING

Drop Hammers. Application of Board Drop Hammers, H. Terhune. Forging & Heat Treating, vol. 8, no. 10, Oct. 1922, pp. 479–481. Should be limited to work requiring but little blocking or breaking down; the power requirements will be from one-fifth to three-fifths that of steam drop hammer.

FOUNDRIES

Alloy-Steel. A Modern Alloy Steel Foundry. Iron & Steel of Canada, vol. 5, no. 10, Oct. 1922, pp. 176–178, 2 figs. Describes plant of Hull Iron & Steel Foundries, Ltd., for plain carbon steels, manganese, chrome-nickel, chrome-vanadium and other alloy steels and its equipment. See also Can. Min. Jl., vol. 43, no. 41, Oct. 13, 1922, pp. 690–692.

Costs. Standard Foundry Costs, Thomas Harper. Metal Industry (N. Y.), vol. 20, no. 10, Oct. 1922, pp. 377–381. Describes system based on U. S. Government income-tax report form 1040, schedule B. Paper read before Metropolitan Brass Founders' Assn.

Handling Troubles. Some Foundry Troubles and Their Remedy, Henry M. Lane. Iron Age, vol. 110, no. 19, Nov. 9, 1922, pp. 1197–1198, 2 figs. Handling 16 tons to make one bathtub; making 100-lb. automobile casting; layout of foundry floors to minimize steps of molders.

Motor Castings, for. Technical Men Direct Foundry, H. E. Diller. Foundry, vol. 50, no. 19, Oct. 1, 1922, pp. 775–782, 14 figs. Motor castings made in new shop of Lycoming Motors Corp., Williamsport, Pa., equipped with conveyors and cranes for continuous pouring; cores for cylinder castings assembled in core room are set as unit in drag.

FUELS

Hogged. Hogged Fuel Used Instead of Oil in Portland Dredges. Eng. News-Rec., vol. 89, no. 19, Nov. 9, 1922, p. 795, 1 fig. Four dredges on Columbia River, Portland, Ore., find it more economical to burn mill refuse.

Utilization. Seventh Report of the Commission for Utilization of Fuels (Septième rapport de la Commission d'utilisation des combustibles). Génie Civil, vol. 81, no. 15, Oct. 7, 1922, pp. 322–325. Describes operations at establishments of Homecourt and Creusot on effect of utilization of fuel and French associations interested in conservation of fuel.

[See also COAL; OIL FUEL; PULVERIZED COAL.]

FURNACES, BOILER

Operation. Boiler Furnaces (Les foyers de chaudières), G. Radiguer. Révue Industrielle, vol. 52, nos. 7, 8, 9, 11 and 12, May, June, July, Sept. and Oct. 1922, pp. 213–220, 263–267, 292–294, 367–375 and 407–415, 19 figs. Grates and mechanical stoking systems of various types; means for facilitating combustion by mixing fuels; combustion chamber; intensity of combustion; dimensions of grates; pulverized coal and its efficiency; pulverization and pulverizers; conveying by compressed air; burners; discusses removal of ashes; danger of explosion from pulverized coal; conveying of pulverized coal; efficiency, etc.

FURNACES, ELECTRIC

See ELECTRIC FURNACES.

FURNACES, FORGING

Construction. Forging Furnace Construction, H. Johnson. Forging & Heat Treating, vol. 8, no. 10, Oct. 1922, pp. 477–479. Results of tests emphasizing necessity of sufficient combustion space and value of insulating brick; reverberatory flame, proper oil temperature and atomization important; sufficient free air to complete combustion is vital. Paper read before Am. Drop Forging Inst.

FURNACES, HEATING

Firing Methods. Heating Furnace Conserves Fuel, W. P. Chandler, Jr. Iron Trade Rev., vol. 71, no. 18, Nov. 2, 1922, pp. 1195–1200 and 1206, 4 figs. Tests conducted on metallurgical units for heating blooms, slabs and billets show continuous recuperative type most economical; suggests design for efficient furnace and recuperator. (Abstract.) Paper read before Am. Iron & Steel Inst. See also Blast Furnace & Steel Plant, vol. 10, no. 11, Nov. 1922, pp. 556–562, 4 figs.

FURNACES, INDUSTRIAL

Temperature Control. Automatic Electric Temperature-Regulating System for Furnaces, I., William Chubb. Am. Mach., vol. 57, no. 18, Nov. 2, 1922, pp. 685–686, 3 figs. Describes system employed by Adolphe Saurer, Switzerland, which automatically controls temperature of furnaces by varying position of damper; fuel consumption is said to be minimized.

FURNACES, METALLURGICAL

Enriched Air, Effect of. The Metallurgical Aspect of the Production of Cold, Cosmo Johns. Engineering, vol. 114, no. 2965, Oct. 27, 1922, p. 524. Points out that oxygen enrichment of air would alter conditions under which metallurgical operations depending upon oxidation of some fuel (carbon, silicon, phosphorus and sulphur) are carried out. Contribution to discussion on Generation and Utilization of Cold held by Faraday Soc. and Brit. Cold Storage and Ice Assn.

Liquid Fuel in. Liquid Fuel in Metallurgical Furnaces, R. C. Helm. Iron Age, vol. 110, no. 18, Nov. 2, 1922, pp. 1137–1139, 4 figs. Handling and burning tar and fuel oil; use in open-hearth and in heat treating wire. (Abstract.) Paper read before Am. Iron & Steel Inst. See also Iron Trade Rev., vol. 71, no. 19, Nov. 9, 1922, pp. 1281–1283, 8 figs.

Use of Liquid Fuel in Metallurgical Furnaces, R. C. Helm. Blast Furnace & Steel Plant, vol. 10, no. 11, Nov. 1922, pp. 549–555, 14 figs. Success in using this type of fuel depends on furnace design, proper methods for its distribution to furnace, and on burners which will atomize fuel so thermal value is utilized. Paper read before Am. Iron & Steel Inst.

G

GAGES

Pressure, Piezo-Electric. A Piezo-Electric Method for the Instantaneous Measurement of High Pressures, J. C. Karcher. U. S. Bur. of Standards Sci. Papers, vol. 18, no. 445, Aug. 4, 1922, pp. 257–264, 1 fig. Describes construction of pressure gage and recording galvanometer.

GAS ENGINES

Steel Works. Gas Consumption and Composition of Exhaust Gases from Large Gas Engines (Gasverbrauch und Zusammensetzung der Abgase von Grossgasmaschinen), Diedrich Rauert. Stahl u. Eisen, vol. 42, no. 41, Oct. 12, 1922, pp. 1545–1553, 9 figs. Results of investigation and measurements on two- and four-cycle engines of the Oberhausen steel works; gas losses; scavenging losses of two-cycle engines.

Winkler-Klein. The Winkler-Klein Double-Piston Two-Stroke Gas Engine (Die Doppelkolben-Zweitaktgasmaschine, Bauart Winkler-Klein). Archiv fur Wärmewirtschaft, vol. 3, no. 9, Sept. 1922, pp. 173–174, 2 figs. Details of improved type of gas engine based on principle of Körting engine.

GAS PRODUCERS

Mechanical Non-Revolving. Modifies Gas Producer Design. Iron Trade Rev., vol. 71, no. 20, Nov. 16, 1922, pp. 1351–1354, 4 figs. Describes new type of mechanical gas producer, embodying water-sealed ash pan and other features, patented by F. H. Treat, Cleveland; is stationary or non-revolving type.

Stassano. Stassano Electric Gas Producer. Mech. Eng., vol. 44, no. 11, Nov. 1922, p. 736, 1 fig. Details and advantages of apparatus. Translated from Motor u. Auto, vol. 19, no. 15, Aug. 31, 1922, pp. 205–207, based on article by Ernesto Stassano in Metallurgia Italiana.

Suction Waste-Wood. Power Can Be Obtained From Refuse, F. Johnstone-Taylor. Power House, vol. 15, no. 20, Oct. 20, 1922, pp. 31–33, 1 fig. Describes arrangement of suction gas plant, generator, scrubbers and gas engine which consumes power.

GAS TURBINES

Application. The Future of the Internal-Combustion Turbine (La turbine à combustion interne; son avenir), Marcel de Coninck. Usine, vol. 31, no. 42, Oct. 21, 1922, p. 27. Possibility of using a hot-air turbine for propulsion of automobiles, ships, airplanes, etc.

GASOLINE

Gum-Forming Constituents. Gum-Forming Constituents in Gasoline, N. A. C. Smith and M. B. Cooke. U. S. Bur. of Mines Reports of Investigations, no. 2394, Sept. 1922, 12 pp. New and convenient method is developed for determining "gum" in gasoline. Study of gums and their formation leads to conclusion that they are polymerized aldehydes, probably formed by oxidation of olefins, etc.

"Sweetening." Use of Bleaching Powder for Sweetening Gasoline, H. W. Young and A. W. Peake. Chem. & Met. Eng., vol. 27, no. 20, Nov. 15, 1922, pp. 972–976, 2 figs. Development of process at Midwest Refining Co.'s plant at Salt Creek, Wyoming, for treating natural-gas gasoline or product from stills. Describes plant and operating practice.

GEAR CUTTING

Bevel Gears. Cutting Spiral Type Bevel Gears, Franklin D. Jones. Machy. (N. Y.), vol. 29, no. 3, Nov. 1922, pp. 204–210, 8 figs. Principles of spiral bevel gear cutting; operation and adjustment of generators designed for cutting gears of different sizes.

GEARS

Automobile, Errors in. Production Errors in Gears. Automotive Industries, vol. 47, no. 18, Nov. 2, 1922, pp. 869–873, 14 figs. Gear noises; causes of trouble found in hardening process, cutting machines and in some cutters; methods of checking gears in production.

Automobile, Noises in. Experience Notes from a Production Notebook, H. J. Crain and J. Brodie. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 409–412 and 437, 8 figs. Notes made by author while investigating sources and causes of noise in automobiles.

Some Causes of Gear-Tooth Errors and Their Detection, K. L. Herrmann. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 391–397, 14 figs. Discusses different gear noises, gives examples of defects that cause noise, and describes device for checking tooth spacing; also instrument for analyzing tooth forms that produce noises.

Bevel. The Continuous Generation of Spiral Bevel

Indicators, Speed
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Injectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Instruments, Electrical Measuring
* General Electric Co.
* Republic Flow Meters Co.
Taylor Instrument Cos.
Weston Electrical Instrument Co.

Instruments, Hardnesss Measuring
* Olsen, Tinius Testing Machine Co.

Instruments, Recording
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* General Electric Co.
* Precision Instrument Co.
* Republic Flow Meters Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Instruments, Scientific
Taylor Instrument Cos.

Instruments, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Insulating Materials (Electric)
* General Electric Co.
* Johns-Manville (Inc.)

Insulating Materials(Heat and Cold)
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
* Illinois Engineering Co.
* Lunkenheimer Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.

Kerosene
* Tide Water Oil Sales Corp'n

Keys, Machine
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Ladles
Northern Engineering Works

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
* Johns-Manville (Inc.)

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Metal-Spinning
Pryibil, P. Machine Co.

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Leather Belting, Packing, etc.
(See Belting, Packing, etc., Leather)

Levers, Flexible (Wire)
* Gwilliam Co.

Lightning Arresters
* General Electric Co.

Linings, Brake
* Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Furnace & Burner Corp'n
Brinckerhoff, H. Gordon Co.
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Linings, Stack
* Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n

Loaders, Wagon
* Gifford-Wood Co.

Lockers, Metal
Manufacturing Equipment & Engrg. Co.

Lockers, Steel or Wood
Wilson, J. G. Corp'n

Locomotives, Electric
* General Electric Co.

Locomotives, Storage Battery
* General Electric Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
* Royersford Fdry. & Mach. Co.
Texas Co.
* Tide Water Oil Sales Corp'n
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.

Machine Work
Brown, A. & F. Co.
* Builders Iron Foundry
* Franklin Machine Co.
* Farrel Foundry & Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Lammert & Mann Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.
* Republic Flow Meters Co.
* Simplex Valve & Meter Co.

Mechanical Draft Apparatus
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Mechanical Stokers
(See Stokers)

Metal Cutting Machines
(See Cutting-off Machines, Metal)

Metal Equipment
Manufacturing Equipment & Engrg. Co.

Metal Reclaiming Mills
(See Mills, Metal Reclaiming)

Metal Treating
* American Metal Treatment Co

Metals, Bearing
American Crucible Products Co.
* General Electric Co.
Phosphor Bronze Smelting Co.

Metals, Perforated
* Hendrick Mfg. Co.

Metals, Thermostatic
Wilson, H. A. Co.

Meter Provers
Equitable Meter Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* Republic Flow Meters Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co.
Weston Electrical Instrument Co

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* Precision Instrument Co. (Inc.)
* Republic Flow Meters Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* Republic Flow Meters Co.
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Gas
Equitable Meter Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Republic Flow Meters Co.
* Simplex Valve & Meter Co

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* Republic Flow Meters Co.

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Republic Flow Meters Co.
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Farrel Foundry & Machine Co.
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Model Development
Nilson-Miller Co.

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ridgway Dynamo & Engine Co

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Shepard Electric Crane & Hoist Co.

Motors, Synchronous
* Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Non-Return Valves
(See Valves, Non-Return)

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Nuts, Machine Screw (Steel & Brass)
* Reed & Prince Mfg. Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Crane Co.
* Foster Engineering Co.
* Lunkenheimer Co.

Oil and Grease Guns
* Royersford Foundry & Machine Co.

Oil Burners, Engines, Filters, Pumps, Separators, etc.
(See Burners, Engines, Filters, Pumps, Separators, etc., Oil)

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
Improved Equipment Co.
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Oil Tanks
* Scaife, Wm. B. & Sons Co.

Oil Well Machinery
* Brownell Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Oilers, Sight Feed
* Lunkenheimer Co.

Oiling Devices
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Lunkenheimer Co.

Oiling Systems
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Lunkenheimer Co.

Oils, Fuel
Texas Co.
* Tide Water Oil Sales Corp'n

Oils, Lubricating
Texas Co.
* Tide Water Oil Sales Corp'n
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co

Gears. Chas. S. Pettit. Eng. Production, vol. 5, no. 106, Oct. 12, 1922, pp. 341–343, 7 figs. Consideration of factors involved.

Epicyclic. Epicyclic Gears: The Gear Ratio Diagram. P. Cormack. Engineering, vol. 114, no. 2965, Oct. 27, 1922, p. 511, 4 figs. Presents diagram which is said to give complete generality in solution of problems on wheel trains, and to bring under intuition the properties of trains when used epicyclically; applicability of diagram extends also to rotational accelerations.

Power-Transmitting Capacity. Mechanical Transmission of Power. Forrest E. Cardullo and Franklin D. Jones. Machy. (N. Y.), vol. 29, no. 3, Nov. 1922, pp. 201–203, 1 fig. Power-transmitting capacities of different types of gearing.

Spherical. Spherical Gears. Charles H. Logue. Mech. Eng., vol 44, no. 11, Nov. 1922, pp. 713–719, 25 figs. Elementary features of bevel-gear design are brought out and applied to spur gears, and real connection between the two types is shown. Author points out necessity for difference in design of teeth heretofore not considered.

Teeth, Strength of. Strength of Internal Spur Gear Teeth. Douglas T. Hamilton. Machy. (Lond.), vol. 21, no. 525, Oct. 19, 1922, pp. 84–86, 5 figs. Brief review of improved method for determining strength of teeth. Factors governing strength; application of Lewis formula to internal gear teeth.

GRINDING

Railway Work. Grinding in the Railroad Industry. Machy. (N. Y.), vol. 29, no. 3, Nov. 1922, pp. 174–177, 11 figs. Notes on truing worn piston rods; grinding guide bars, axles, pins, valve gear links, slide valves, and car wheels.

GRINDING MACHINES

Surface. Surface Grinders for Many Uses. Abrasive Industry, vol. 3, no. 11, Nov. 1922, pp. 335–344, 17 figs. Description of various types.

H

HANDLING MATERIALS

Automobile Plants. Handling Methods in Automobile Assembly. Fred H. Colvin. Am. Mach., vol. 57, no. 18, Nov. 2, 1922, pp. 693–694, 5 figs. Runways, inclines and turntables in Franklin and Reo plants; conveyors and other devices which reduce labor and handling time.

Automotive Plant, in. Handling Material in Automotive Plant. M. R. Dennison. Iron Age, vol. 110, no. 20, Nov. 16, 1922, pp. 1269–1273, 5 figs. System at Studebaker plant, South Bend, Ind. Machine-shop layout and handling of scrap. (Abstract.) Paper read before Soc. Indus. Engrs.

Continuous Package Elevators. What It Pays to Know About Material Handling. W. T. Spivey. Factory, vol. 29, no. 5, Nov. 1922, pp. 529–531, 572–574, 576 and 578, 9 figs. Tells how continuous package elevators can be fitted into general material-handling plan, thereby effecting economies.

Factory. Handling Materials Economically. B. A. Hildebrant. Iron Trade Rev., vol. 71, no. 16, Oct. 19, 1922, pp. 1069–1071, 3 figs. Eastern grinding-wheel manufacturer uses special trucks and conveyors for transporting abrasives and wheels; simple method of carrying work through shop; method of storage prevents damage to finished product.

Finished Products. Handling the Finished Products of Industry. Graham L. Montgomery. Chem. & Met. Eng., vol. 27, no. 17, Oct. 25, 1922, pp. 824–826. How to study existing handling systems; where to seek decrease in non-productive labor; studying flowsheets to reduce non-productive labor. Suggested procedure in layout of new systems.

Iron Ore. Carrying Iron Ore to Ford Furnaces. A. J. Hain. Iron Trade Rev., vol. 71, no. 17, Oct. 26, 1922, pp. 1121–1123, 3 figs. Ore is taken from lake vessels in Detroit River, dumped into hoppers, fed onto belt conveyor and into small barges, for shipment up River Rouge. Describes mechanical equipment in use.

HARDNESS

Testing. Hardness of Solid Bodies and Its Relation to Their Chemical Composition (Untersuchung über die Härte fester Stoffe und ihre Beziehung zur chemischen Konstitution). A. Reis and L. Zimmermann. Zeit. für Physikalische Chemie, vol. 102, no. 3-4, 1922, pp. 298–358, 3 figs. The various methods of hardness testing; mechanics of hardness testing; relation between hardness and other cohesive properties, hardness and temperature, hardness and mixed crystals; author's own experiments on hardness testing.

HEAT TRANSMISSION

Thermal-Conductivity Values. Transfer of Heat. Terrell Croft. Combustion, vol. 7, no. 5, Nov. 1922, pp. 277–281, 9 figs. Examples of thermal-conductivity values are given in tabular form for various metals, heat-insulating materials, liquids and gases. Portion of author's forthcoming book, Practical Heat.

HEATING AND VENTILATION

Humidifying Plants. The Humidification of Air (Luftbefeuchtung). H. Körting. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 42, Oct. 21, 1922, pp. 1000–1001, 6 figs. Points out advantages of local over central humidification, in textile mills, distinction between pressure-water and pressure-air humidification, and describes working process of local pressure-air plant.

HEATING, ELECTRIC

Ironless Induction. Electric Heating by Ironless Induction. E. F. Northrup. Gen. Elec. Rev., vol. 25, no. 11, Nov. 1922, pp. 656–666, 2 figs. Principles which apply in heating inductance with currents of frequencies sufficiently high to make use of iron unnecessary for increasing magnetic induction.

HEATING, STEAM

France. Central Heating (Le chauffage central). Journal des Usines à Gaz, vol. 46, no. 20, Oct. 20, 1922, pp. 312–316, 3 figs. Discusses boilers of various types, including magazine boilers, anthracites and coke, firing and combustion.

Heat-Consumption Meter. Heat-Supply Meters for Central-Heating Plants (Wärmeverbrauchsmesser für Zentralheizungen). H. Nelken. Wärme, vol. 45, no. 32, Aug. 18, 1922, pp. 392–393, 3 figs. Described heat meter which has been installed in 1600 plants in Copenhagen, shows that steam consumption can be determined the same as electricity and gas consumption. It is based on principle of thermo-couples which generate an electric current. Consumed heat is measured with electrolyte meter.

HOUSING

Progress in. Housing. Monthly Labor Rev., vol. 15, no. 4, Oct. 1922, pp. 113–158. Building permits in principal cities, January to June, 1922. Work of New York Building Congress. Housing situation in Philadelphia. Progress of housing program in England.

HYDRAULIC ACCUMULATORS

Air-Pressure. Air-Pressure Hydraulic Accumulator. Times Trade & Eng. Supp., vol. 11, no. 225, Oct. 28, 1922, p. 164, 1 fig. Describes design introduced by Werner & Pfleiderer, Cannstadt, Germany, in which accumulator is loaded not by weights but by pressure of air compressed in number of steel bottles.

HYDRAULIC TURBINES

Racing. Racing of Turbines (Das Durchgehen von Turbinen). Paul Attlmayr. Elektrotechnik u. Maschinenbau, vol. 40, no. 42, Oct. 15, 1922, pp. 487–488, 1 fig. Concludes that with proper regulation it will not take place and danger can be avoided by adequate application of rotating mass.

HYDRAULICS

Chart Solution of Formulas. Chart Solution of Hydraulic Formulas. J. B. Cutler. Power, vol. 56, no. 20, Nov. 14, 1922, pp. 768–770, 3 figs. Presents charts for calculating speed of turbine runner and for determining rise of pressure in hydraulic system resulting from retardation of water's velocity.

HYDROELECTRIC DEVELOPMENTS

New York State. Present Tendencies of Water-Power Development in New York State. John P. Hogan. Am. Soc. Civ. Engrs.—Proc., vol. 48, no. 9, Nov. 1922, pp. 1741–1757, 6 figs. Describes present developments on interior or intermittent streams and tendencies of power developments on them.

New Zealand. The Commercial Aspect of Water-Power Developments in New Zealand. F. T. M. Kissel. New Zealand Jl. Sci. & Technology, vol. 5, no. 4, Sept. 1922, pp. 210–219. General objections to supply from small stations; comparison with Canadian conditions; probable load; proposals. Reply to paper by W. Lancelot Moore in same jl. vol. 5, no. 2.

Niagara Falls. Proposed 450,000-Hp. Development at Niagara Falls. Power, vol. 56, no. 17, Oct. 24, 1922, pp. 636–637, 4 figs. Project proposed by American Super-Power Corp., Buffalo, N. Y., plans development of 450,000 hp., taking water through canal from 4 mi. above falls and discharging it into lower gorge near Lewiston under effective head of 301 ft.; also includes building 4-circuit transmission line from power house to metropolitan district of New York City, distance of 315 mi.

HYDROELECTRIC PLANTS

Abitibi River, Can. Hydro-Electric Development on the Abitibi River. James Dick. Can. Engr., vol. 43, no. 19, Nov. 7, 1922, pp. 509–513, 9 figs. Description of 24,000-hp. development at Twin Falls, Ont., for Abitibi Power & Paper Co.; concrete gravity-type dam 85 ft. high; earth dam 950 ft. long; reinforced-concrete power house; Westinghouse generators and Morris turbines.

Automatic. Automatic Plant Replaces Cable Drive. Ralph B. Purinton. Elec. World, vol. 80, no. 19, Nov. 4, 1922, pp. 977–979, 4 figs. Details of installation of automatic hydroelectric generating plant at Fairbury, Neb.

Bavaria. Bavarian Hydroelectric Plants (Bayerische Grosswasserkraftanlagen). E. Mattern. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 43–44, Oct. 28, 1922, pp. 1013–1018, 2 figs. Details of plants being constructed; volume of flow-off, water head and power output of Bavarian rivers; navigation conditions; dam projects; power requirement in Bavaria and its supply; cost of supply; socialized, state or private development.

France. The Hydroelectric Plant of Jourdain Island [L'usine hydroélectrique de l'Isle-Jourdain (Vienne)]. J. Reyval. Révue Générale de l'Électricité, vol. 12, no. 16, Oct. 21, 1922, pp. 597–607, 16 figs. Describes plant of Vienne Power Co., developing water powers of river Vienne and work already completed including barrage dams for various works, transmission lines and electric equipment.

Sites. Aspects of Study and Selection of Water-Power Sites, William T. Taylor. Elec. Rev., vol. 91, no. 2341, Oct. 6, 1922, pp. 474–476. Discusses water resources, records of run-off, storage, dam-tunneling and other facts to be considered in survey.

I

INDUSTRIAL MANAGEMENT

Committee Work. Committee Work in Management. R. J. Baker. Indus. Management (N. Y.), vol. 64, no. 5, Nov. 1922, pp. 263–264. What committees are, why they exist and how they function. Deals with staff committees acting in advisory capacities.

Depression Periods. Scientific Management During Times of Depression. Richard A. Feiss. Taylor Soc. Bul., vol. 7, no. 4, Aug. 1922, pp. 126–128. Advantages.

Development, United Kingdom. Development of Management in the United Kingdom. James F. Whiteford. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 703–704. Discusses development in standardization, specialization, employee representation, costs and statistics, buildings and equipment, wage payment, and time study.

Economics. Study of Economics as a Need in Industry. Iron Age, vol. 110, no. 17, Oct. 26, 1922, pp. 1086–1089. Value to management; selecting employees; labor relations; cost reducing; material handling. Outline of papers presented at Soc. Indus. Engrs.

Great Britain. The New Management in Great Britain. A. P. M. Fleming and J. G. Pearce. Indus. Management (N. Y.), vol. 64, no. 5, Nov. 1922, pp. 257–261. How British industry is increasing industrial efficiency. "Vertical" combinations of industrial groups forming closed production chains, centralization of technical knowledge; decentralization of standard manufactures and assembly and of sales.

Overhead Costs. The Puzzle of the Overhead. W. L. Churchill. Management Eng., vol. 3, no. 5, Nov. 1922, pp. 257–259. Discusses overhead in connection with reduction of costs.

Price Analysis. Price Changes. Joseph E. Pogue. Management Eng., vol. 3, no. 5, Nov. 1922, pp. 267–272, 7 figs. Studies which help purchasing agent. Purpose of price investigation is properly to sample measurements available, concentrate them into series of workable figures, and submit figures to quantitative analysis by means of graphic chart.

Progress since 1912. Ten Years' Progress in Management. L. P. Alford. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 699–703. Review of progress; factors marking progress of management; use of management mechanisms; management education, human factor in industry; service motive; management results. (Abridged.) See also Management Eng., vol. 3, no. 5, Nov. 1922, pp. 277–282.

Production Management. How a Production Manager, Single-Handed, Promotes Simplification. Thomas W. Howard. Factory, vol. 29, no. 5, Nov. 1922, pp. 519–522, 554, 556 and 558. Discusses common problems of production managers, and offers suggestions for their solution.

Production Methods. Modern Production and Costing Methods in Locomotive Shops. A. E. Howell. Ry. Engr., vol. 43, no. 513, Oct. 1922, pp. 377–382, 7 figs. Outline of general scheme of organization which can be modified and adapted to suit most manufacturing plants. (Abstract.) Paper read before Instn. Locomotive Engrs.

Routing. Combination Routing. D. J. Walsh, Jr. Taylor Soc. Bul., vol. 7, no. 4, Aug. 1922, pp. 131–134 and (discussion) 134–141, 1 fig. To meet problem of small quantities and short operations.

Tool and Supply Control. The Control of Operating Tool and Supply Cost. F. A. Mance. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 407–408. By alloting to each department precise amounts of tools and supplies to be used for each operation, a control is established throughout factory that must accord with number of cars built. Over period of 4 years in plant cited, system has shown decrease in cost of renewals of 71 per cent.

Tool Distribution. Tools and Their Control. Robert R. Langée. Management Eng., vol. 3, no. 5, Nov. 1922, pp. 273–276, 4 figs. Methods which provide an inventory, record facts of disbursement, and show need of replenishing.

Tool Storage and Disbursement. Storage and Disbursement of Small Tools. W. J. Sansom. Am. Mach., vol. 57, no. 19, Nov. 9, 1922, pp. 713–716, 4 figs. Different ways of keeping track of tools; single and double-check systems; register system; check room of future.

[See also TIME STUDY.]

INDUSTRIAL ORGANIZATION

Departmental. Departmental Organization. Lee H. Mandeville and R. F. Gale. Assn. Iron & Steel Elec. Engrs., vol. 4, no. 10, Oct. 1922, pp. 725–737, 3 figs. First article contains brief description in connection with three different organizations. Second article describes operating department in manufacturing steel plant, employing 2500 to 3000 men.

Training for Administration. Training for Administration in Industry. H. Riall Sankey. Indus. Management (Lond.), vol. 8, no. 7, Oct. 19, 1922, pp. 215–216. Author emphasizes importance of recognizing administration as one of four factors in industry, and necessity of establishing adequate means for proper education and training of its personnel. (Abstract.) Address before Instn. Indus. Administration.

Overhead Track System
(See Tramrail Systems, Overhead)

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
Linde air Products Co.

Packing, Ammonia
France Packing Co.

Packing, Asbestos
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rubber
* Jenkins Bros.
* Johns-Manville (Inc.)

Packing, Sheet
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Paint, Metal
* General Electric Co.
* Johns-Manville (Inc.)

Paints, Acid Resistant
Silumite Products Corp'n

Paints, Steel Preservative
Silumite Products Corp'n

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paper Mill Machinery
* Farrel Foundry & Machine Co.

Paper Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
Dixon, Joseph Crucible Co.
Keuffel & Esser Co.

Penstocks
Smith, S. Morgan Co.

Perforated Metals
(See Metals, Perforated)

Petroleum Products
Texas Co.
* Tide Water Oil Sales Corp'n

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* United States Cast Iron Pipe & Fdry. Co.
Weatherly Foundry & Mfg. Co.

Pipe, Riveted
* American Spiral Pipe Wks.
* Walsh & Weidner Boiler Co.

Pipe, Riveted Steel
* Springfield Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe Welded
* American Spiral Pipe Wks.
* Crane Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Bending Machines
* Hydraulic Press Mfg. Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Pipe Joint Clamps
(See Clamps, Pipe Joint)

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Vogt, Henry Machine Co.

Piston Rings
Nilson-Miller Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Plate Metal Work
(See Steel Plate Construction)

Platinum
Wilson, H. A. Co.

Pneumatic Tools, Tubes, etc.
(See Tools, Tubes, etc., Pneumatic)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Foundry & Machine Co.

Poppet Valve Engines
(See Engines, Steam, Poppet Valve)

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Eastern Machinery Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Farrel Foundry & Machine Co.
* General Electric Co.
* Jones, W. A. Fdry. & Mch. Co.
* Medart Co.
* Morse Chain Co.
Pryibil, P. Machine Co.
* Royersford Foundry & Machine Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
* Hydraulic Press Mfg. Co.
Philadelphia Drying Machinery Co.

Presses, Blanking
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.
* Toledo Machine & Tool Co.

Presses, Draw
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.
* Toledo Machine & Tool Co.

Presses, Embossing
* Hydraulic Press Mfg. Co.
* Toledo Machine & Tool Co.

Presses, Extruding
* Bliss, E. W. Co.
* Farrel Foundry & Machine Co.
* Hydraulic Press Mfg. Co
* Toledo Machine & Tool Co.

Presses, Foot
* Bliss, E. W. Co.
* Royersford Foundry & Machine Co.
* Toledo Machine & Tool Co.

Presses, Forging
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.
* Toledo Machine & Tool Co.

Presses, Forming
* Farrel Foundry & Machine Co.
* Hydraulic Press Mfg. Co
* Toledo Machine & Tool Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
* Farrel Foundry & Machine Co.
* Hydraulic Press Mfg. Co.
Mackintosh-Hemphill Co.
* Olsen, Tinius Testing Machine Co.
Philadelphia Drying Machinery Co.

Presses, Punching and Trimming
* Bliss, E. W. Co.
Long & Allstatter Co.
* Royersford Foundry & Machine Co.
* Toledo Machine & Tool Co.

Presses, Sheet Metal Working
* Bliss, E. W. Co.
* Toledo Machine & Tool Co.

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc. Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Worthington Pump & Machy Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Eastern Machinery Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Machine Co.
* Medart Co.
Wood's, T. B. & Sons Co.

Pulleys, Iron
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mch. Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
Kenworthy, Chas. F. (Inc.)

Pulverized Fuel Feeders
(See Feeders, Pulverized Fuel)

Pulverizers
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc., Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Ingersoll-Rand Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
* Morris Machine Works.
Taber Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works.
* Worthington Pump & Machinery Corp'n

Pumps, Dry Vacuum
(See Pumps, Vacuum)

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Davidson M. T. Co.
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Filter Press
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Hydraulic Press Mfg. Co.

Pumps, Hand
* Gouids Mfg. Co.

Pumps, Hydraulic
* Farrel Foundry & Machine Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Hydraulic Press Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Olsen, Tinius Testing Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Pumps, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lunkenheimer Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Oil (Hand)
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Goulds Mfg. Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.

INDUSTRIAL RELATIONS

Improving. Two Points of View on Employees' Relations. Ry. Age, vol. 73, no. 20, Nov. 11, 1922, pp. 893–895. Officers and employees should be on more friendly basis. Value of system athletics. Two contributions, by Ward W. Adair and Leander H. Poor.

Partnership Plan. A Successful Employee Partnership Plan. Alfred Stuart Myers. Indus. Management (N. Y.), vol. 64, no. 5, Nov. 1922, pp. 289–295, 2 figs. How it has been developed and applied at Dutchess Bleachery, Inc. Labor turnover has been reduced from 56.6 to 15 per cent.

INSULATORS, HEAT

Heat-Transmission Calculation. Heat Insulation (Varmeisolering), E. Suenson. Teknisk Tidsskrift, vol. 46, nos. 35 and 37, Aug. 30 and Sept. 13, 1922, pp. 137–144 and 145–152, 12 figs. Aug. 30: Propogation and transmission of heat; table of heat-transmisson coefficient of various materials. Sept. 13: Heat radiation, air spaces, Rietschel's and other methods for calculation; examples.

IRON AND STEEL

Analyses. Suggests Analyses of Iron and Steel, Paul V. Kline. Iron Trade Rev., vol. 71, no. 17, Oct. 26, 1922, p. 1124. Describes methods for determination of quantity of phosphorus and manganese in iron and steel, found by author to be short and to give accurate results.

Crystalline Structure. Crystal Structure of Iron and Steel (Zum Kristallbau des Eisens und Stahls), Arne Westgren and Gösta Phragmén. Zeit. fur Physikalische Chemie, vol. 102, no. 1, 1922, pp. 1–25, 10 figs. Results of experiments by means of X-rays on crystalline structure of pure iron, effect of carbon on molecular structure of hardened steel, carbon steels, crystal form of cementite.

INTERNAL-COMBUSTION ENGINES

Electric Motors, vs. Steam—Gas—Electricity—Oil (Dampf—Gas—Elektrizität—Oel), Constantin Redzich. Wärme- u. Kälte-Technik, vol. 24, no. 18, Sept. 15, 1922, pp. 209–211. A technical comparison, showing economic advantages of internal combustion engines as small power plants.

Entropy Cycle Diagram. Simple Straight-Line Entropy Diagrams of Gas-Engine Cycles. (Ueber einfachste geradlinige, aber entropiediagrammartige Darstellungen von Kreisprozessen), Richard von Dallwitz-Wegner. Warme, vol. 45, no. 34, Sept. 1, 1922, pp. 411–413, 5 figs. Recommends use of described Turnd diagram in place of complicated entropy S diagram for engine designs.

Marine, Line Shafts for. Line Shafts for Marine Internal Combustion Engines, Joseph Hecking. Mar. Eng., vol. 27, no. 11, Nov. 1922, pp. 711–719, 8 figs. Analysis made in connection with revision of rules of Am. Bur. of Shipg.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES; SEMI-DIESEL ENGINES.]

K

KEYWAYS

Plates, Manufacture of. The Operating Scope of the Eccentric Press and Slot Stamping Machine in the Manufacture of Keyway Plates (Arbeitsbereich der Exzenterpresse und der Nutenstanzmaschine bei der Herstellung der Nutenbleche), F. Bluhm. Maschinenbau (Betrieb), vol. 1, no. 12–13, Sept. 23, pp. 750–753, 14 figs. Comparison of methods of making keyway plates by use of stamping machines of modern design and by use of eccentric presses taking different plate sizes into consideration.

L

LABOR

Hours of Work. Union Scale of Wages and Hours of Labor, May 15, 1921, U. S. Bur. of Labor Statistics, no. 302, Aug. 1922, 219 pp.

Working Hours. Engineer, vol. 134, nos. 3484 and 3485, Oct. 6 and 13, 1922, pp. 363–364 and 377–379. Abstracts of report of special committee set up to study question of hours of work and other subject.

Three-Shift System. The Three-Shift System in the Iron and Steel Industry. Colliery Guardian, vol. 124, no. 3227, Nov. 3, 1922, p. 1087. Summary of results of inquiry conducted by Int. Labor Office, Geneva, abstracted from Int. Labor Rev., Oct.

LABOR TURNOVER

Reduction. Reducing Turnover in Seasonal Industries, H. S. Gilbertson. Management Eng., vol. 3, no. 5, Nov. 1922, pp. 286–288, 2 figs. Outlines plan which removes incentive on part of employer to overman establishment.

LABORATORIES

Research. The Research Laboratory and Its War on Waste, Fred Grotts. Indus. Management (N. Y.), vol. 64, no. 5, Nov. 1922, pp. 309–314 and 317, 3 figs. Specific organization, procedure and suggestions. Notes on how to conduct plant survey; how to design for standardization of component materials; proper application of various product steels; waste reclamation; lubricating oils and their use as fuel oil.

LATHES

Automatic. Automatic Production in a Locomotive Works. Can. Machy., vol. 28, no. 16, Oct. 19, 1922, pp. 17–20, 15 figs. Discusses auto lathe and its operation: operations on piston rod plants, valve heads, bull rings, etc.

Milling. The Milling Lathe, Louis Watkins. Machy. (Lond.), vol. 21, no. 525, Oct. 19, 1922, pp. 65–66, 2 figs. Details of single-purpose machine for production of castellated shafts.

Railway-Wheel. Railway Wheel Lathe Practice. Ry. Gaz., vol. 37, no. 19, Nov. 10, 1922, pp. 583 and 588, 1 fig. Tests of new 48-in. lathe in Cowlairs Works, North British Ry.

Types. Modern Machine Tools (Les Machines-Outils modernes), A. Catherine. Outillage, vol. 6, nos. 23, 32, 34, 36, 38, 41 and 42, June 10, Aug. 12, 26, Sept. 9, 23, Oct. 14 and 21, 1922, pp. 750–751, 995–997, 1150–1152, 1198–1200, 1259–1262, 1400–1402 and 1433–1435, 62 figs. Discusses power and precision of modern machine tools, precision being a function of power. Packing-off lathes of Smith & Coventry Ontario, and French types; lathes for railway locomotive wheels and tires; machine tools used in manufacture of rolling stock, including presses, cylinder boring and grinding machines, etc.; tapping machines; sliding lathes of French construction, and other types of lathes; lathe attachments.

LIQUID AIR

Liquefaction Process. The Linde Refrigerating Machine and Air-Liquefaction Process. Zeit. fur komprimierte u. flussige Gase (Linde festival no.), vol. 22, no. 6, 1922. Contains following articles: The Importance of the Linde Refrigerating Machine for the Development of Modern Refrigerating Engineering, M. Hirsch, pp. 68–69; The Development of the Air-Liquefaction Industry, F. Pollitzer, pp. 70–74, 3 figs.; The Spectral Origin of Oxygen, Philipp Siedler, pp. 74–77, 4 figs.; The Production of Hydrogen and Water Gas, N. Caro, pp. 77–80, 5 figs.; Liquid Oxygen in Engineering, R. Lepsius, pp. 80–87, 11 figs.

LOCOMOTIVE BOILERS

Grate Cleaning. Grate-Cleaning Problem (Zur Feuerreinigungsfrage), Hartmann Stiegel. Wärme, vol. 45, no. 36, Sept. 15, 1922, pp. 437–438. Discusses problem of grate cleaning in locomotive boilers from thermotechnical viewpoint. Describes use of so-called simple tipping grate of Hungarian design, and points out its advantages over slag removal by means of shoveling.

LOCOMOTIVES

Connecting-Rod Failures. Locomotive Connecting Rod Failures. Ry. Engr., vol. 43, no. 514, Nov. 1922, pp. 401–403 and 406, 1 fig. Report submitted to Ministry of Transport by A. Mount on failure of two engines belonging to Lond. & N. W. Ry.

Cylinders. The Manufacture of Locomotive Cylinders Using Super-Heated Steam, A. F. Gibbs. Foundry Trade Jl., vol. 26, no. 323, Oct. 26, 1922, pp. 336–337 and (discussion) 337–340, 4 figs. Details of molding and casting, and practical results.

Developments. Steam Locomotives in the Twentieth Century (Damplokomotivet i det 20. Aarhundrede), A. Andersen. Teknisk Tidsskrift, vol. 46, no. 33, Aug. 16, 1922, pp. 127–136, 7 figs. Reviews part of developments; increase in number of cylinders and in adhesive weight, steam consumption, speed, thermal efficiency, superheating; describes original types.

Electric. See ELECTRIC LOCOMOTIVES.

Hanomag Freight. The 10,000th Hanomag Locomotive (Die 10,000 Hanomag-Lokomotive). Gewerbefleiss, vol. 101, no. 7, July 1922, pp. 189–191, 1 fig. Characteristics of freight-train compound locomotives delivered to Bulgarian state railway; gage, 1435 mm.; wheel diam., 1340 mm.; heating surface, 252.5 sq. m.; weight empty, 76.5 tons; total length 14,400 mm.

Heavy Types. Heavy Locomotives in South America. Ry. Jl., vol. 28, no. 11, Nov. 1922, pp. 14–16, 3 figs. Describes new Pacific, Mountain and Santa Fe locomotives and operation in Argentina; built by Baldwin Locomotive Works. Tractive force of Pacific type, 10,000 kg. at 80 km. per hr.; Mountain type, 9400 kg. at 60 km. per hr.; and Santa Fe type, 12,500 kg.

High-Center-of-Gravity. The Rise of the Firing Floor. Ry. & Locomotive Eng., vol. 35, no. 10, Oct. 1922, pp. 259–261, 6 figs. Points out that locomotive development has increased height above rails with proportionate rise of center of gravity of engine as a whole.

Injectors. Elesco Exhaust Steam Injector. Ry. Jl., vol. 28, no. 11, Nov. 1922, pp. 22–23, 4 figs. Injector is used in modern locomotives for feeding boiler by use of exhaust steam. Discusses design and operation.

Michigan Central Railway. Locomotive Power Output Per Unit of Weight. Ry. Engr., vol. 43, no. 514, Nov. 1922, pp. 420–422, 4 figs. Describes 2-8-2-type locomotive of Mich. Central R. R. introduced with view to securing maximum power output per unit of weight and economy in use of fuel.

Mountain Type. Service Records of U. P. Mountain Type Locomotive. Ry. Mech. Engr., vol. 96, no. 11, Nov. 1922, pp. 615–617, 4 figs. Performance indicates that No. 7000 exceeds both theoretical starting and horsepower capacity.

Operation and Maintenance. 30th Annual Convention of the Traveling Engineers Assn. Ry. & Locomotive Eng., vol. 35, no. 11, Nov. 1922, pp. 298–306, 4 figs. Abstract of reports presented covering flange oilers, operation and maintenance of oil-burning locomotives, mechanical firing of locomotives, relation of air-brake defects to traffic delays and fuel consumption.

Pacific. Pacific Type for Passenger and Fast Freight. Ry. Age, vol. 73, no. 21, Nov. 18, 1922, pp. 947–948, 1 fig. Describes 4-6-2 locomotive built by Baldwin Locomotive Wks. for Atlantic Coast Line; 69-in. driving wheels.

Rack. New Rack Locomotives for the South Indian Railway. Ry. Gaz., vol. 37, no. 17, Oct. 27, 1922, p. 513, 1 fig. Details of "X"-class 8-coupled engines with trailing radial single axle, built by Swiss Locomotive Co., Winterthur.

Starter. Locomotive Starter Designed to Eliminate Taking Slack. Ry. Rev., vol. 71, no. 19, Nov. 4, 1922, pp. 613–615, 3 figs. New device applied to trailer or tender truck axle adds 12,900 lb. to maximum tractive effort. Patented by Clement F. Street. See also Ry. Age, vol. 73, no. 19, Nov. 4, 1922, pp. 858–859.

Stoker Firing. Effect of Mechanical Firing on Cost of Train Operation. Ry. Rev., vol. 71, no. 20, Nov. 11, 1922, pp. 656–658. Road tests show that stoker increases economy and capacity of locomotive; improves passenger as well as freight train operation. (Abstract.) Paper read before Traveling Engrs. Assn.

Three-Cylinder. Characteristics of Three-Cylinder Locomotives, F. Meineke. Ry. Mech. Engr., vol. 96, no. 11, Nov. 1922, pp. 617–619, 5 figs. Attain 15 per cent more hauling power for same adhesive weight; reduction in coal consumption.

New Three-Cylinder 2-8-2 Type Locomotive for the German State Railways. Ry. Gaz., vol. 37, no. 18, Nov. 3, 1922, pp. 547 and 549, 1 fig. Advanced German design, calculated to render it capable of dealing with fast passenger and express-goods trains; boiler pressure 200 lb.; speed 85 m.p.h.

Wheel Balancing. Calculation of Balance Weights in Coupled Driving Wheels for Locomotives (Calcolo grafostatico dei contrappesi per le ruote motrici ed accoppiate delle locomotive), Nicola Fabiano. Industria, vol. 36, nos. 14, 15 and 17, July 31, Aug. 15 and Sept. 15, 1922, pp. 265–268, 283–286 and 323–327, 40 figs. July 31: Rotating mass, alternating mass, and mass in compound motion. Aug. 15: Determination of weight of balance weight. Sept. 15: Balance weights for driving wheels, their shape and dimensions.

LUBRICANTS

Graphite. Graphite as a Lubricant. Oil News, vol. 10, no. 20, Oct. 20, 1922, pp. 35–36. Discusses addition of graphite to oil for lowering friction resistance of journal; efficiency of flake graphite in lubrication.

LUBRICATING OILS

Properties. Lubricating Oil (Schmieröl), F. E. Kretzschmar. Dinglers Polytechnisches Journal, vol. 337, no. 16, Aug. 12, 1922, pp. 163–166, 4 figs. Kinds of lubricants and their properties, choice, examination, and purification.

M

MACHINE SHOPS

Design. New Workshops for the Gas Light and Coke Company. Concrete & Constructional Eng., vol. 17, no. 9, Sept. 1922, pp. 571–578, 9 figs. Constructional features of new workshops at Beckton for centralizing mechanical work attached to upkeep and repair throughout works, showing design, precast concrete purlins, etc.

MACHINE-TOOL INDUSTRY

United States. The Machine Tool Exhibition, New Haven, Conn. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 728–730 and 776. Symposium of following addresses: Influence of the Machine Tool in America, James Hartness; Income Analysis in United States, Oswald W. Knauth; German Industry's New Export Policy Based on Standardization, Oscar R. Wikander; Precision, Standardization and Production, Earle Buckingham.

MACHINE TOOLS

Manufacture. Building Machine Tools. Eng. Production, vol. 5, nos. 106 and 107, Oct. 12 and 19, 1922, pp. 349–353 and 373–377, 33 figs. Plant and methods of Cincinnati Milling Machine Co.

Standardization. Suggestions as to Standardization of Machine Tools, Fred H. Colvin and K. H. Condit. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 720–721. Points out advantage of uniformity. Notes on interchangeability and accuracy; T-slots; problem of securing adoption of standards.

MACHINERY

Installation Service. A Machinery Installation Service, F. E. Lister. Management Eng., vol. 3, no. 5, Nov. 1922, pp. 283–286, 1 fig. Costs decreased 55 per cent; machines increased 53 per cent. It is shown that operations of installation-service work can be definitely and easily controlled, eliminating considerable waste in industry.

MAGNESIUM

Castings. Magnesium Castings (Magnesiumguss), Carl Irresberger. Giesserei-Zeitung, vol. 19, no. 41, Oct. 17, 1922, pp. 599–602. Notes on magnesium, magnesium alloys and their properties; smelting; molds; precautions in casting; cleaning; properties of castings and their useful possibilities.

MALLEABLE IRON

Testing. Testing Malleable Iron, M. L. Piedbœuf. Foundry Trade Jl., vol. 26, no. 321, Oct. 12, 1922, p.

* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Morris Machine Works
* Smidth, F. L. & Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Davidson, M. T. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Davdison, M. T. Co
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Punches, Metal (Hand Power)
* Parker Supply Co.

Punches, Multiple
* Bliss, E. W. Co.
Long & Allstatter Co.
Mackintosh-Hemphill Co
* Toledo Machine & Tool Co.

Punches, Power
* Bliss, E. W. Co.
* Roversford Fdry & Mch. Co.
* Toledo Machine & Tool Co.

Punches and Dies
* Bliss, E. W. Co.
* Roversford Fdry & Mch Co.
* Toledo Machine & Tool Co.

Punching and Coping Machines
Long & Allstatter Co.

Punching and Shearing Machines
* Bliss, E. W. Co.
Long & Allstatter Co.
* Royersford Fdry & Mch. Co.
* Toledo Machine & Tool Co.

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Elliott Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Superheater Co
Taylor Instrument Cos.

Pyrometers, Optical
Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co

Pyrometers, Radiation
Taylor Instrument Cos.

Racks, Machine, Cut
* Brownell Co.
* James, D. O. Mfg. Co
* Jones, W. A. Fdy. & Mch. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
Norwalk Iron Works Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Refuse Destructors
(See Destructors, Refuse)

Regulators, Blower
* Davis, G. M. Regulator Co.
* Foster Engineering Co.

Regulators, Damper
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
* Parker Supply Co.

Regulators, Electric
* General Electric Co.

Regulators, Feed Water
Elliott Co.
* Foster Engineering Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
Equitable Meter Co.
* Foster Engineering Co.
* General Electric Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
Taylor Instrument Cos.
Wilson, H. A. Co.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
Long & Allstatter Co.

Rivets (Steel, Brass & Copper)
* Reed & Prince Mfg. Co.

Rods, Bronze
Phosphor Bronze Smelting Co.

Roller Bearings
(See Bearings, Roller)

Rolling Doors and Shutters
(See Doors and Shutters, Steel or Wood, Rolling)

Rolling Mill Machinery
* Farrel Foundry & Machine Co.
Mackintosh-Hemphill Co.

Rolls, Crushing
* Farrel Foundry & Machine Co.
* Worthington Pump & Machinery Corp'n

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
* Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
* Johns-Manville (Inc.)

Rope, Bronze
Phosphor Bronze Smelting Co.

Rope, Hoisting
Clyde Iron Works Sales Co.
Phosphor Bronze Smelting Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Phosphor Bronze Smelting Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope Drives
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rubber Goods, Mechanical
* Jenkins Bros.

Rubber Mill Machinery
* Farrel Foundry & Machine Co.

Sand Blast Apparatus
* De La Vergne Machine Co

Saw Mill Machinery
* Allis Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Scales, Automatic
Boston Scale & Machine Co.

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screws, Drive (Hardened)
* Parker Supply Co.

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Cap & Set
Allen Mfg. Co.
* Reed & Prince Mfg. Co.

Screws, Cap & Set (Steel)
* Reed & Prince Mfg. Co.

Screws, Machine (Steel and Brass)
* Reed & Prince Mfg. Co.

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker Supply Co.

Screws, Wood (Steel, Brass and Bronze)
* Reed & Prince Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Mchy. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Bronze
Phosphor Bronze Smelting Co

Shafting, Cold Drawn
* Medart Co.

Shafting, Flexible
* Gwilliam Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Sharpening Devices, Rock Drill
* Ingersoll-Rand Co.

Shears, Alligator
* Farrel Foundry & Machine Co.
Long & Allstatter Co.
* Roversford Foundry & Machine Co.
* Toledo Machine & Tool Co.

Shears, Hydraulic
Mackintosh Hemphill Co.

Shears, Plate
Long & Allstatter Co.
Mackintosh-Hemphill Co.
* Toledo Machine & Tool Co.

Shears, Squaring
* Bliss, E. W. Co.
* Toledo Machine & Tool Co.

Sheaves, Rope
Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mch. Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheet Metal Working Machinery
* Bliss, E. W. Co.
* Farrel Foundry & Machine Co.
* Toledo Machine & Tool Co.

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.
Phosphor Bronze Smelting Co.

Shelving, Metal
Manufacturing Equipment & Engrg. Co.

Shutters, Automatic Fire
Wilson, J. G. Corp'n

Shutters, Fireproof
Wilson, J. G. Corp'n

Shutters, Steel or Wood, Rolling
Wilson, J. G. Corp'n

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Sirens
(See Whistles, Steam)

Slide Rules
Dietzgen, Eugene Co.
Gilson Slide Rule Co.
Keuffel & Esser Co.

Slitting Machines
* Bliss, E. W. Co.

Sluice Gates
(See Gates, Sluice)

Smoke Recorders
* Sarco Co. (Inc.)

290. Describes system established by author at foundry in Herstal, Belgium. Translated from paper read before Assn. Technique de Fonderie.

MEASURING INSTRUMENTS

Lever-Gage. Development of Lever-Gage Measurement (Ausbau der Fühlhebelmessung), Max Kurrein. Werkstattstechnik, vol. 16, no. 20, Oct. 15, 1922, pp. 613-616, 8 figs. Describes new measuring tools of the Fortuna Works, Stuttgart-Cannstatt, Germany, exhibited at Leipzig Exhibition.

METAL SPRAYING

Application. The Metal Spray Process, Its Characteristics, Effects and Application (Das Metallspritzverfahren, seine Eigenart, Wirkungen und Anwendbarkeit), H. Speer. Autogene Metallbearbeitung, vol. 15, nos. 16, 17, 18, 19 and 20, Aug. 15, Sept. 1-15, Oct. 1 and 15, 1922, pp. 230-232, 241-245, 259-261, 273-277 and 290-294. Aug. 15: Writer classifies process into three groups, namely, (1) cold wet and dry metallization; (2) hot metallization; and (3) fusion metallization. Sept. 1: Galvanization. Sept. 15 and Oct. 1: Aluminum. Oct. 15: Brass, bronze, copper and nickel plating.

METALS

Density Measurements. Measurements of the Density of Metals and Alloys at High Temperatures with Special Consideration of the Liquid State (Dichtemessungen von Metallen und Legierungen bei hohen Temperaturen mit besonderer Berücksichtigung des flussigen Zustandes), K. Bornemann, Paul Siebe and M. Whele. Zeit. für Metallkunde, vol. 14, no. 8, Aug. 1922, pp. 329-334, 3 figs. Measurements according to the dilatometer process. Determination of specific volumes for tin, bismuth and their alloys in liquid state up to 800 deg. cent.

Elasticity. Elasticity of Some Metals and Alloys Up to Temperatures Near Melting Point (Die Elastizität einiger Metalle und Legierungen bis zu Temperaturen, die ihrem Schmelzpunkt naheliegen; II. Elastizitätsmodul), K. R. Koch and R. Dieterle. Annalen der Physik., vol. 68, no. 13, Aug. 31, 1922, pp. 441-462, 3 figs. Discusses modulus of elasticity and experiments carried out to determine it, concluding that with rising temperature modulus of elasticity decreased more slowly than the modulus of torsion, constant of Poisson, therefore, increasing with increasing temperature.

Hot Working. The Hot Working of Metals, R. Genders. British Non-Ferrous Metals Research Assn. Bul., no. 7, Oct. 1922, pp. 7-11. Notes on temperature at which hot working is finished, forging or stamping temperatures, experiments on hot working of brasses of various compositions carried out by F. Doerinckel and J. Trockels, and the extrusion process. Bibliography.

Invar and Elinvar. The Invar and Elinvar Metals, Their Properties and Application (Les metaux "Invar" et "Elinvar," leurs propriétés, leurs applications), Ch.-Ed. Guillaume. Révue de l'Industrie Minérale, no. 44, Oct. 15, 1922, pp. 545-568, 17 figs. Describes research work carried out to find substitute for platinum for production of standards. Discusses mechanical properties of nickel steels of various nickel content, production of invar and elinvar and their application, use of nickel steels in watch manufacture, etc.

Overstrain in. Overstrain, Internal Stresses and Creep, Zay Jeffries and R. S. Archer. Chem. & Met. Engg., vol. 27, no. 17, Oct. 25, 1922, pp. 833-837, 5 figs. Effects similar to those caused by working iron at blue heat have been observed in nickel and certain alloys; these phenomena and results of overstrain are all due to rapid acquisition of increased strength on slip planes.

Polishing. Principles of Metal Polishing. Machy. (Lond.), vol. 21, no. 524, Oct. 12, 1922, pp. 45-47, 2 figs. Notes on terms used in polishing field; relation of design to finish; properties of glue for polishing wheels; preparation and use of glue; glue heaters.

Quenching. Quenching: A Mathematical Study of Various Hypotheses on Rapid Cooling, K. Heindlhofer. Physical Rev., vol. 20, no. 3, Sept. 1922, pp. 221-242, 9 figs. Mathematical study of temperature changes in a hot body after quenching, assuming various conditions of heat flow from surface. Heat flow from a metal cylinder quenched in water.

Strained, X-Ray Examination of. X-Ray Examination of Inner Structure of Strained Metals. I. Chiefly on Copper Wires, Akimasa Ono. Kyushu Imperial University Memoirs of College of Eng., vol. 2, no. 5, 1922, pp. 241-260, 19 figs. X-ray examination was performed on copper wires, and also on metals annealed after straining, by taking interference figures, which show that crystal lattices form fibrous structure in pulled or drawn state, and this structural rearrangement proceeds as degree of strain increases.

Temperature, Effect of. The Effect of Temperature on Some of the Properties of Metals, F. C. Lea. Instn Mech. Engrs.—Proc., no. 4, June 1922, pp. 885-904 and (discussion) 905-912, 12 figs. Results of tests show clearly that below 250 deg. cent., effect of temperature, particularly on steels, does not give cause for anxiety in their use in cases where above limit is not exceeded. Many alloys of copper and of aluminum are considerably effected by temperatures of 250 cent.

MILLING

Fixtures. Multiple Fixtures for Milling Small Parts, C. E. Stevens. Am. Mach., vol. 57, no. 20, Nov. 16, 1922, pp. 759-760, 6 figs. Describes fixtures used in milling service-machine parts; design applicable to fixtures for parts of other machines.

MOLDING MACHINES

Turnover Table. A New Turnover Table Moulding Machine. Eng. Production, vol. 5, no. 107, Oct. 19, 1922, pp. 369-370, 1 fig. Details of machine manufactured by Darling & Sellers, Ltd., Keighley, Yorks, England.

Types. The Selection of Suitable Molding Machines (Die Wahl der geeigneten Formmaschine), W. Boenigk. Maschinenbau, (Betrieb), vol. 1, no. 11, Sept. 9, 1922, pp. 694-699, 10 figs. Describes types of molding machines, useful possibilities, relative performances of different types; economy of molding machines as compared with hand molding.

MOLDING METHODS

Loam Molding. History of Loam Molding in Province of Liége, J. Varlet. Can. Foundryman, vol. 13, no. 9, Sept. 1922, pp. 20-23 and 37, 7 figs. Gives examples of typical loam-molding jobs including those for large flywheels, pouring calender, marine-engine cylinder, etc.

Molding (Historique du moulage en terre dans la province de Liége), J. Varlet. Fonderie Moderne, no. 10, Oct. 1922, pp. 285-293, 7 figs. Reviews its developments in Liége; gives various examples of its application; pouring metal, etc.

MOTOR TRUCKS

Body Design. Bodywork in 1923. Motor Transport, vol. 35, no. 922, Oct. 30, 1922, pp. 563-565, 6 figs. Study of trend for 1923 with some suggestions for further developments.

Six-Wheelers. The Latest Six-Wheel Designs. Motor Transport, vol. 35, no. 922, Oct. 30, 1922, pp. 561-562, 4 figs. Details of new stabilizing device and new six-wheeler design, the Bartle-Watson.

Thornycroft. The "W" Type Thornycroft Chassis. Motor Transport, vol. 35, no. 920, Oct. 16, 1922, pp. 485-487, 8 figs. Particulars of side-type vehicle designed for net load of six tons or gross load of seven.

Types. New Models in 1923. Motor Transport, vol. 35, no. 922, Oct. 30, 1922, pp. 539-556, 47 figs. Latest designs of petrol, steam and electric vehicles and review of manufacturers' and concessionaires' programs for 1923.

MOTORCYCLES

Design. Showing Up the Weak Spots in Motorcycle Design, M. W. Bourdon. Automotive Industries, vol. 47, no. 16, Oct. 19, 1922, pp. 766-767. British six-day motorcycle trial indicates marked improvements in design.

N

NOZZLES

Flow Curves. The Supersaturated Condition as Shown by Nozzle Flow, A. L. Mellanby and William Kerr. Instn. Mech. Engrs.—Proc., no. 4, June 1922, pp. 855-878 and (discussion) 878-883, 11 figs. Gives flow curves for simple convergent type nozzles in order to demonstrate clearly discharge effect; and to show degree of support afforded application of theoretical conception to nozzles, by actual experimental results.

O

OFFICE MANAGEMENT

Filing. New Wrinkles in Filing Systems, H. H. Greene. Office Management, vol. 8, no. 1, Sept. 1922, pp. 13-14. Suggestions and ideas relating to best methods of securing papers withdrawn from files; keeping track of "charge outs" and getting them back to file.

OIL ENGINES

Double-Acting Two-Stroke. Working Practice in the Design of Large Double-Acting Two-Stroke Engines, A. E. L. Chorlton. North-East Coast Instn. Engrs. & Shipbldrs., advance paper, no. 2345Q, for meeting Nov. 3, 1922, 35 pp., 54 figs. Mechanical treatment of subject dealing with factors of design of principal parts of engine.

Solid-Injection. Solid Injection Oil Engine in Isolated Power Plant, H. E. Briggs. Nat Engr., vol. 26, no. 11, Nov. 1922, pp. 531-534. Compares installation and service costs with other forms of prime movers; lays stress on skilled help required. Paper read at convention of Indiana State Assn. N.A.S.E.

OIL FUEL

Burners. Steam Atomizing Oil Burner Gives Conical Flame. Power, vol. 56, no. 20, Nov. 14, 1922, pp. 764-765, 4 figs. Describes Enco burner which is said to be exceptionally adaptable for burning tar oil in gas-works plants.

Industrial Utilization. Industrial Utilization of Liquid Fuels (De l'utilisation industrielle des combustibles liquides), Ed. Bruet. Outillage, vol. 280, no. 40, Oct. 7, 1922, pp. 1318-1321, 7 figs. Use of liquid fuels in furnaces and boilers, and in automobiles; combustion of petroleum; oil burners; atomizers; particulars of tests of oil firing in locomotives by Orleans Railroad Co.

Resources, French. Our Liquid Fuel Resources (Nos ressources en combustibles liquides), M. R. Lauret. Outillage, vol. 280, no. 40, Oct. 7, 1922, pp. 1312-1317. Describes resources of France and French colonies in petroleum, oil shale, peat and lignite, alcohols, carbonization of coal, and questions of national motor fuel.

Sediment in. Methods for Determining Sediment in Fuel Oils, A. D. Bauer. U. S. Bur. of Mines Reports of Investigations, no. 2408, Oct. 1922, 4 pp. Investigation undertaken to aid in determining satisfactory limits for different methods for determining sediment.

OPEN-HEARTH FURNACES

Modern Types. Modern Types of Open-Hearth Furnaces (Neuere Bauarten von Siemens-Martinöfen), Ernst Blau. Giesserei-Zeitung, vol. 19, no. 40, Oct. 10, 1922, pp. 585-590, 8 figs. Notes on progress in design; position of chambers; slag pockets; furnace heads; tilting furnaces.

100-Ton. Design of a Proposed 100-Ton Open-Hearth Furnace, C. L. Kinney, Jr. and G. R. McDermott. Iron Age, vol. 100, no. 18, Nov. 2, 1922, pp. 1131-1135, 12 figs. Thermal efficiency and heat balance of furnace of 1912 and one of 1922. Study of furnace operation and heat balance results in improvements which minimize losses; construction of checker work important; modifications in port design to obtain efficient flame propagation. (Abstract.) Paper read before Am. Iron & Steel Inst. See also Iron Trade Rev., vol. 56, no. 19, Nov. 9, 1922, pp. 1274-1277, 1 fig.

OXY-ACETYLENE WELDING

Burners. Oxy-Acetylene Welding Burners and Their Faults (Der Acetylen-Sauerstoffschweissbrenner und seine Fehler), Fr. Mangiamelie. Autogene Metallbearbeitung, vol. 15, no. 18, Sept. 15, 1922, pp. 253-259. It is shown that none of the burners in use fulfil theoretical requirement of mixture proportion, and that more or less all burners consume too much oxygen.

Cast Iron. Cast Iron Welding by the Oxyacetylene Process, S. W. Miller. Am. Welding Soc. Jl., vol. 1, nos. 8-9, Aug.-Sept. 1922, pp. 72-83. Points out that acetylene is best gas for welding because of its high flame temperature; preheating is necessary in all complicated cast-iron pieces; greatest difficulty is to take care of strains which occur during preheating, welding and cooling.

Defects in Welds. Defects in Gas Welds, Marcel Piette. Welding Engr., vol. 7, no. 10, Oct. 1922, pp. 19-23, 14 figs. Lack of penetration and adhesion said to be most common sources of trouble. Remedies. Translated from Revue de la Soudure Autogène.

Water Content of Gases. The Influence of Water Content in Acetylene and Oxygen in Oxy-Acetylene Welding (Ueber den Einfluss des Wassergehaltes im Acetylen und Sauerstoff bei der autogenen Schweissung), Theo. Kautny. Autogene Metallbearbeitung, vol. 15, no. 15, Aug. 1, 1922, pp. 207-210, 1 fig. Includes table showing influence of impurities in oxygen on costs of autogenous welding and danger of explosion.

P

PISTONS

Aluminum. Aluminum Pistons. Automobile Engr., vol. 12, no. 167, Sept. 1922, pp. 277-282, 16 figs. Reviews recent work in Germany. Gives composition of alloys, piston clearance, compression ratio, fuel consumption and other matter.

PLATES

Circular, Deformation of. Deformation of Circular Plates Supported at Individual Points (Die Verbiegungen in einzelnen Punkten unterstützter kreisformiger Platten), A. Nádai. Physikalische Zeit., vol. 23, no. 18, Sept. 15, 1922, pp. 366-376, 6 figs. Discusses elastic deformation and torsion as applicable to steam-turbine plates.

Drilling vs. Punching. Drilling versus Punching, J. D. Hope. British Machine Tool Eng., vol. 2, no. 17, Sept.-Oct. 1922, pp. 541-543, 3 figs. Relative advantages and merits of drilling and punching processes as applied to structural steel work and shipbuilding. Writer concludes that each process has its own spheres wherein it proves itself most efficient.

POWER PLANTS

Equipment. Power Plant of Forest Laundry, Walter C. Edge. Nat. Engr., vol. 26, no. 11, Nov. 1922, pp. 518-521, 6 figs. Describes mechanical and electrical equipment.

Industrial. Power Plant of the Hoover Suction Sweeper Company. Power, vol. 56, no. 20, Nov. 14, 1922, pp. 750-754, 8 figs. Plant designed to supply heating-season load; arrangements made for installation of three 320-hp. uniflow engines and four 3430-sq. ft. boilers.

Textile Mills. The American Printing Co.'s Plant at Fall River. Power Plant Eng., vol. 26, no. 21, Nov. 1, 1922, pp. 1037-1042, 9 figs. Describes power plant of large textile plant, electrical system of which is interconnected with lines of local public-service company.

12,000-Kw. A 12,000-Kw. Industrial Power Plant. Power, vol. 56, no. 18, Oct. 31, 1922, pp. 674-679, 7 figs. Details of Kokomo plant of Pittsburgh Plate Glass Co. Three turbine units of 4000 kw. each supply 2300-volt power to factory substation.

POWER TRANSMISSION

Hydraulic Waves. Wave Transmission of Power. Engineer, vol. 134, nos. 3487 and 3488, Oct. 27 and Nov. 3, 1922, pp. 444-445 and 466-468, 7 figs.

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp, Wm & Sons Ship & Engine Bldg Co.
* Farrel Foundry & Machine Co.
* Fawcus Machine Co.
* Franklin Machine Co
* Hooven, Owens, Rentschler Co.
Lammert & Mann Co.
Mackintosh-Hemphill Co.
Nilson-Miller Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* Cleveland Worm & Gear Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Spraying Machinery, Metal
Metals Coating Co. of America

Spray Nozzles
(See Nozzles, Spray)

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Gifford-Wood Co.
* Medart Co.
Nilson-Miller Co.

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Engines, Separators, Superheaters, Traps, Turbines, etc.
(See Engines, Separators, Superheaters, Traps, Turbines, etc., Steam)

Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Foster Engineering Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Sarco Co. (Inc.)

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.

Steel, Cold Rolled
* Union Drawn Steel Co.
Cumberland Steel Co.

Steel, High Speed
Haynes Stellite Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Tool
Haynes Stellite Co.

Steel, Vanadium
* Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Glasgow Iron Co.
* Cole, R. D. Mfg. Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
* Keeler, E. Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Steering Engines
(See Engines, Steering)

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Stokers, Chain Grate
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
Green Engineering Co.

Stokers, Hand Operated
* McClave Brooks Co.

Stokers, Overfeed
* Detroit Stoker Co.
* McClave Brooks Co.
* Murphy Iron Works

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.

Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Strainers, Steam
* Foster Engineerlng Co.
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Foster Engineering Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Farrel Foundry & Machine Co.
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
Brinckerhoff, H. Gordon Co.
Heine Boiler Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.

Switches, Electric
* General Electric Co.

Synchroscopes
Weston Electrical Instrument Co.

Synchronous Converters
(See Converters, Synchronous)

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Tachometers
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Tachoscopes
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Tackle Blocks
(See Blocks, Tackle)

Tank Work (Air, Gas, Oil, Water)
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Tanks, Acid
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)

Tanks, Oil
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Hendrick Mfg. Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Brownell Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
* Murray Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Testing Machines
* Olsen, Tinius Testing Machine Co.

Textile Machinery
* Franklin Machine Co.

Thermometers
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Thermometers, Distance
Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.

Thermostats
* Bristol Co.
* General Electric Co.
* Powers Regulator Co.
Wilson, H. A. Co.

Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co. (Inc.)

Tie Tamping Outfits
* Ingersoll-Rand Co.

Time Controllers
(See Regulators, Time)

Time Recorders
* Bristol Co.

Tongs, Crane
Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Lathe
Haynes Stellite Co.

Tools, Machinists' Small
* Atlas Ball Co.

Tools, Planer
Haynes Stellite Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
Nilson-Miller Co.

Torches, Hand
* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Electric Crane & Hoist Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Mundy, J. S. Hoisting Engine Co.
* Roebling's, John A. Sons Co.

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Illinois Engineering Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Illinois Engineering Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n

Tube Cleaners, Boiler
* Johns-Manville (Inc.)

Tubes, Boiler
Detroit Seamless Steel Tubes Co.

Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.
Detroit Seamless Steel Tubes Co.

Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.

Tubes, Locomotive
Detroit Seamless Steel Tubes Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubes, Superheater
Detroit Seamless Steel Tubes Co.

Tubing, Steel, Seamless
Detroit Seamless Steel Tubes Co.

Tumbling Barrels
* Farrel Foundry & Machine Co.
Northern Engineering Works
* Royersford Fdry. & Mch. Co.

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mch. Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.

Turbo-Blowers
Brinckerhoff, H. Gordon Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Turbo-Compressors
* Ingersoll-Rand Co.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.

Discusses system of power transmission by means of hydraulic waves developed by George Constantinesco, and describes Dorman portable wave-power generator and rock drill for Bombay municipality. See also description of wave-transmission plant for Bombay in Indian & Eastern Engr., vol. 51, no. 3, Sept. 1922, pp. 141–146, 2 figs.

PRESSES

Metal-Working. Progress in the Construction of Presses for Metalworking (Fortschritte im Bau von Pressen für die Metallbearbeitung). Metall-Technik, vol. 48, no. 28, July 6, 1922, pp. 318–322, 2 figs. The Huber pressing process. Hydraulic presses for pressing of hollow bodies; wheel-drawing presses; horizontal and inclined presses; eccentric breakers and crank presses.

PRINTING PRESSES

Shop Methods. Some Printing Press Shop Methods. Fred H. Colvin. Am. Mach., vol. 57, no. 18, Nov. 2, 1922, pp. 681–682, 3 figs. Describes crankpin drilling fixture; pneumatic presses for taking off and replacing crank disks; crank-planer job and crankshaft straightener.

PULVERIZED COAL

Boiler Firing. Firing With Pulverized Coal (Die Verfeuerung staubförmiger Braunkohlenprodukte im Rahmem unserer Energiewirtschaft), M. Dolch. Montanistische Rundschau, vol. 14, nos. 18, 19 and 20, Sept. 16, Oct. 1 and 16, 1922, pp. 381–384, 396–399 and 411–413. Discusses question of complete gasification and compares thermal efficiency of pulverized coal and generator gas.

Fire Hazards. Pulverized Fuel and Its Hazards. Nat. Fire Protection Assn., vol. 16, no. 1, July 1922, pp. 52–62, 3 figs. Discusses types of systems, dryers, burners, pulverizing, fires and explosions.

Open-Hearth Furnaces. Firing Martin Furnace with Pulverized Coal (Le chauffage des fours Martin au charbon pulvérisé). Metallurgie, vol. 54, no. 43, Oct. 26, 1922, p. 1575. Gives particulars of new patent based on injecting pulverized coal with air preheated to high degree and discusses results.

Tests. French Mine Uses Pulverized Anthracite. J. Gould Coutant. Combustion, vol. 7, no. 4, Oct. 1922, pp. 196–198, 4 figs. Describes 5 series of tests carried out with anthracite fines and culm waste from which it is concluded that coal of no commercial value produces as much steam according to calorific value as best quality, that anthracite waste can be burned in pulverized form, etc.

PUMPS

Rotary. New Idea in Pumps With Rotating Pistons (Nouvelle conception de pompe rotative à palettes), A. Poitrineau. Arts et Métiers, vol. 75, no. 24, Sept. 1922, pp. 260–264, 9 figs. Discusses piston pumps, rotary piston pumps and centrifugal pumps, and describes new design, advantages of which are minimum cost, wear practically nihil and high efficiency.

Treble-Ram. Electrically Driven Treble-Ram Pump. Engineer, vol. 134, no. 3484, Oct. 6, 1922, p. 349, 2 figs. Describes pump installed at coal mine in Scotland, where work had formerly been done by turbine centrifugal pumps. Gives results of tests showing considerably higher efficiency than turbine pump tested at same time.

PUMPS, CENTRIFUGAL

Rees-Roturbo. Turbine Pumps. Beama, vol. 11, no. 5, Nov. 1922, pp. 762–764, 6 figs. Single-stage and multi-stage types made by Rees Roturbo Mfg. Co., Ltd.

R

RAILS

Welded Joints. Welded Rail Joints. M. T. Ryder. Am. Welding Soc.—Jl., vol. 1, nos. 8–9, Aug.-Sept. 1922, pp. 21–25. Deals with cast, resistance, seam and thermit welds. Present conditions and future developments. See also Welding Engr., vol. 7, no. 10, Oct. 1922, pp. 24–25.

RAILWAY ELECTRIFICATION

Berlin. Electrification of the Berlin Municipal und Suburban Railway (Einführung der elektrischen Zugförderung auf den Berliner Stadt-, Ring- und Vorortbahnen), H. Heyden. Glasers Annalen, vol. 91, no. 7, Oct. 1, 1922, pp. 105–109, 7 figs. Three-rail system with use of direct current was adopted. Electric power is to be supplied from central stations of 100,000 volts through two transformer stations, one in eastern and one in western suburb. Details of driving cars.

Brazil. Electrification of the Paulista Railway. Tramway & Ry. World, vol. 52, no. 18, Oct. 12, 1922, pp. 169–173, 13 figs. Describes recent railway electrification in Brazil and gives details of equipment of rolling stock, transformer substations, etc.

Chicago. I. C. Adapts Electrification to Terminal Traffic. Ry. Age, vol. 73, no. 17, Oct. 21, 1922, pp. 743–745. Extended investigation leads to selection of 1500-volt direct current with overhead contact for Chicago terminals of Illinois Central.

Chile. The Electrification of Zone I of the Chile State Railways (Die Elektrisierung der Zone I der Chilenischen Staatsbahnen), W. Musswitz. Elektrotechnische Zeit., vol. 43, no. 40, Oct. 5, 1922, pp. 1234–1236, 6 figs. Notes on power supply; power stations; locomotives.

RAILWAY MANAGEMENT

Great Britain. Railway Management, Sam Fay. Engineer, vol. 134, no. 3484, Oct. 6, 1922, pp. 361–362. Discusses British Railway Act, 1921; management under groups; American plan. (Abstract.) Presidential address delivered before Inst. of Transport.

Organization of Work. Organization in Railroad Work, R. N. Begien. Ry.-Rev., vol. 71, no. 19, Nov. 4, 1922, pp. 620–623. Discusses duties of officers and executives.

Purchases and Stores Department. The Real Functions of the Department of Purchases and Stores, H. C. Pearce. N. Y. R. R. Club—Official Proc., vol. 32, no. 8, Oct. 1922, pp. 6757–6764 and (discussion) 6764–6784. Its purpose, scope and organization.

RAILWAY MOTOR CARS

Electric. New Motor Coaches for the Burgdorf-Thun Railway. Ry. Gaz., vol. 37, no. 17, Oct. 27, 1922, pp. 514–517, 5 figs. Constructed on 3-phase system, but designed to permit of their conversion to high-tension single-phase when required.

France. New Railway Motor Cars (Les nouvelles automotrices à moteur à explosion des Chemins de fer de l'État), P. Calfas. Génie Civil, vol. 81, no. 18, Oct. 28, 1922, pp. 381–384, 9 figs. Describes some new cars driven by explosion engines of French state railways, tests of which show decided advantages, viz., reduction of materials, attendants and cost of operation, etc.

Gasoline. Motor Driven Rail Car with High Power Unit. Ry. Age, vol. 73, no. 21, Nov. 18, 1922, pp. 943–944, 2 figs. Maryland & Pennsylvania train consisting of gasoline motor coach and trailer; 120-hp. engine; seats 76 passengers.

Steam. Steam-Propelled Unit Railway Motor Car. Ry. Mech. Engr., vol. 96, no. 11, Nov. 1922, pp. 620–622, 5 figs. Oil-burning, steam-driven car built by Unit Ry. Car Co., Boston, Mass. for Can. Nat. Ry.; has water-tube-type boiler.

Storage-Battery. Trial Trips with Storage-Battery Self-Propelled Cars on the Austrian Federal Railway (Versuchsfahrten mit Speichertriebwagenzügen auf den österreichischen Bundesbahnen), Robert Meixner. Elektrotechnik u. Maschinenbau, vol. 40, no. 32, Aug. 6, 1922, pp. 373–379, 6 figs. Results of trial runs carried out in 1921.

Types. Railway Motor Cars (Motorvagnar för järnvägsdrift), E. Hubendick. Teknisk Tidskrift, vol. 52, nos. 35 and 36, Sept. 2 and 9, 1922, pp. 555–557 and 571–573, 16 figs. Describes examples of 2-axle and 4-axle cars; gives dimensions and equipment including Diesel-electric.

RAILWAY OPERATION

Train Control. Automatic Train Control From Four Viewpoints. Ry. Age, vol. 73, no. 18, Oct. 28, 1922, pp. 805–808. Abstracts of three papers presented before Railroad Section of West. Soc. Engrs. as follows: Development of Train Control, W. J. Eck; Automatic Train Control from a Mechanical Standpoint, C. F. Giles; Train Control from the Operating Standpoint, A. W. Towsley. See also Ry. Signal Engr., vol., 15, no. 11, Nov. 1922, pp. 427–432, and (discussion) 433–434.

Automatic Train Control—a Signal Engineer's View, Thomas S. Stevens. Ry. Age, vol. 73, no. 19, Nov. 4, 1922, pp. 853–854 and (discussion) 854–855. Discusses possibility of saving expense of wayside signals.

The Kerr Automatic Train Control and Fog Signalling Apparatus. Ry. Gaz., vol. 37, no. 14, Oct. 6, 1922, pp. 420–424, 8 figs. In its design special attention was paid to making apparatus weather-proof, that both "danger" and "clear" signals should be given positively, that no signal indication should depend upon a spring for its action, etc.

RAILWAY SHOPS

Developments. The Development of Workshop Engineering in Railway Shops (Die Entwicklung der Werkstattechnik in den Eisenbau-Werkstätten), E. Schellewald. Bauingenieur, vol 3, no. 19, Oct. 15, 1922, pp. 577–584. Past development and future prospects.

RAILWAY SIGNALING

A. T. & S. F. Railway. Signal Construction on the Sante Fe, G. K. Thomas. Ry. Signal Engr., vol. 15, no. 11, Nov. 1922, pp. 435–438, 10 figs. Program for 1922 includes quite extensive installations of automatic block signals. Notes on signal indications, battery housing and special features, signal control circuits and approach lighting

Automatic Reminder. Mechanical Automatic Reminder of Shunted and Waiting Trains. Ry. Engr., vol. 43, no. 513, Oct. 1922, p. 365, 1 fig. Describes apparatus, installed at signal boxes, said to be inexpensive and efficient, besides being automatic in its action.

Color-Light Signals. Modern Signals Expedite Heavy Suburban Traffic. Ry. Age, vol. 73, no. 18, Oct. 28, 1922, pp. 785–788, 5 figs. Color-light signals and traffic levers increase capacity of available tracks on Lackawanna.

Electric-Light. Electric Lighting of the Signals at the Padova Stations (L'illuminazione elettrica dei segnali nelle stazioni di Padova centrale e Padova campo di marte), G. C. Palmieri. Rivista Tecnica delle Ferrovie Italiane, vol. 22, no. 3, Sept. 15, 1922, pp. 77–93, 26 figs. partly on supp. plates. Detailed description of signal cabin and equipment, day and night signals, electric-light equipment, control and safety engines, etc.

Power-Operated Facing Points. Long-Distance Operation of Facing Points. Ry. Gaz., vol. 37, no. 17, Oct. 27, 1922, pp. 509–510, 6 figs. partly on p. 511. Details of 28 cases of long-distance operation of points cited by E. J. Pearson, President of N. Y., N. H & H. R. R.

Three-Position and Upper-Quadrant. Traffic Improvements and New Signaling at King's Cross, Great Northern Railway. Ry. Gaz., vol. 37, no. 18, Nov. 3, 1922, pp. 541–544, 10 figs. partly on pp. 545–546. Describes reorganization of signaling arrangements, no point alterations having been made; applications of three-position and upper-quadrant signaling. Details of Siemens electric route-indicating signal, employed in connection with new signaling at this station, given on p. 549, 1 fig.

Three-Position System. Weissenbruch's Signal System on the Belgian State Railways, T. S. Lascelles. Ry. Gaz., vol. 37, no. 15, Oct. 13, 1922, p. 457. Describes three-position system introduced in Belgium in 1919. Signals are mechanically worked by double-wire system. (Abstract.) Paper read before Instn. Ry. Signal Engrs.

Track Circuits. Direct Current Track Circuits, W. J. Thorrowgood. Ry. Engr., vol. 43, no. 514, Nov. 1922, pp. 404–406. Contribution to report of Sub-Committee "D" of Am. Ry. Assn. on factors involved in standard of safety for track circuits.

Transient Circuits. Transient Track Circuits. Ry. Engr., vol. 43, no. 513, Oct. 1922, pp. 371 and 386, 1 fig. With transient track circuit, current is only applied to rails for approximately half a second for every train.

RAILWAY TRACK

Crossings. Lackawanna Continues Grade Crossing Elimination. Eng. News-Rec., vol. 89, no. 19, Nov. 9, 1922, pp. 778–781, 10 figs. Suburban tracks elevated through East Orange, N. J. Depression vs. elevation compared; flat-slab elevated structure developed. Station layout is described.

RAILWAYS

Brazil. The Railways of Brazil (Die Eisenbahnen Brasiliens), H. Bargheer. Archiv für Eisenbahnwesen, nos. 4 and 5, July-Aug. and Sept.-Oct. 1922, pp. 860–877 and 1085–1107. July-Aug.: Natural and economic difficulties; export railways. Sept.-Oct.: Colonization railways; government subsidies and private enterprises; transportation of low-grade bulk goods; railways and waterways. Bibliography.

Germany. The Railways of the German Government, 1919–1920 (Die Eisenbahnen des Deutschen Reichs 1919 und 1920). Archiv für Eisenbahnwesen, no. 5, Sept.-Oct. 1922, pp. 1108–1115. Operating statistics reprinted from official statistics of State Traffic Bureau, vol. 40 and 41.

REDUCTION GEARS

Double. Double-Reduction Gears for Marine Use: United States Practice, J. Livingston Booth. Engineering, vol. 114, no. 2965, Oct. 27, 1922, pp. 516–517. Calls attention to progress made in United States in gear design and manufacture, and points out that it would be well to determine whether many of troubles experienced with double-reduction gears have not arisen from causes which can be overcome with better knowledge of art of design and manufacture.

REFRACTORY MATERIALS

Thermal Conductivity. Determination of Thermal Conductivity of Fire-Resisting Materials (Die Bestimmung der Wärmeleitfähigkeit feuerfester Stoffe), K. Arndt. Dinglers Polytechnisches Journal, vol. 337, no. 18, Sept. 9, 1922, pp. 185–187. Distinguishes between interior and exterior heat conductivity; methods of heating and cooling of refractories.

REFRIGERANTS

Liquid Sulphur Dioxide. Liquid Sulphur Dioxide. Chem. Trade Jl. & Chem. Engr., vol. 71, no. 1843, Sept. 15, 1922, pp. 318–319, 1 fig. Describes new system of manufacture in Argentine Republic of liquid sulphurous anhydride for refrigerating purposes, being an improvement of Hänsch and Schroeder processes. Also construction and operation of plant. Translated from Giornale di Chimica Industriale ed Applicata.

REFRIGERATING MACHINES

Air. Refrigerating Machines with Air as the Agent, Maurice Leblanc. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 731–733, 8 figs. Describes new machine designed by author. Translated from Revue Universelle des Mines, vol. 14, no. 3, Aug. 1, 1922, pp. 1–36.

Compression, Efficiency Tables for. Principles and Methods for the Calculation of Efficiency Tables of Compression Refrigerating Machines (Grundlagen und Methoden für die Berechnung der Leistungstabellen für die Kompressionskältemaschinen), E. Altenkirch. Zeit. für die gesamte Kälte-Industrie, vol. 29, no. 9, Sept. 1922, pp. 165–172, 7 figs. Recalculation of tables for ammonia SO_2 and CO_2 in connection with rules published by German Refrig. Soc., and curves for each.

Piping. Piping Used in Refrigerating-Machine Construction (Rohrleitungen im Kältemaschinenbau), H. Heinzmann. Zeit. für die gesamte Kälte-Industrie, vol. 29, nos. 1, 2 and 3, Jan., Feb. and Mar. 1922, pp. 8–13, 22–27 and 43–50, 5 figs. Description and calculation of pipes with notes on choice of material; insulation of steam pipes; standards adopted by Assn. German Engrs. in 1912; bending and expansion of pipes.

REFRIGERATING PLANTS

Efficiency. Refrigerating Plant Economy, Victor J. Azbe. Universal Engr., vol. 36, no. 4, Oct. 1922, pp. 19–22. Results of investigation showing that refrigerating plants are least efficient of all; gives figures to show that production of ice should be double

* Kerr Turbine Co.
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.

Turbo-Pumps
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

Turntables
Northern Engineering Works

Underfeed Stokers
(See Stokers, Underfeed)

Unions
* Crane Co.
* Lunkenheimer Co.
* Vogt, Henry Machine Co.

Unions, Flange
* Hydraulic Press Mfg. Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Goetze Gasket & Packing Co.
* Jenkins Bros
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Jenkins Bros.
* Simplex Valve & Meter Co.
* Smith, H. B. Co.

Valves, Air, Relief
* Foster Engineering Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Altitude
* Foster Engineering Co.
* Simplex Valve & Meter Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Foster Engineering Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* Davis, G. M. Regulator Co.
* Foster Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Illinois Engineering Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
* Crane Co.
* Davis, G. M. Regulator Co.
* Foster Engineering Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Blow-off
* Ashton Valve Co.
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
Elliott Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Butterfly
* Crane Co.
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Check
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Electrically Operated
* Chapman Valve Mfg. Co.
* Dean, Payne (Ltd.)
* General Electric Co.
Kennedy Valve Mfg. Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Exhaust Relief
* Crane Co.
* Davis, G. M. Regulator Co.
* Foster Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Illinois Engineering Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.

Valves, Float
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Foster Engineering Co.
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co
* Simplex Valve & Meter Co.

Valves, Foot
* Crane Co.
* Worthington Pump & Machy. Corp'n

Valves, Gate
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Vogt, Henry Machine Co.

Valves, Hose
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Hydraulic
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Hydraulic Press Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Hydraulic Operating
* Hydraulic Press Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Davis, G. M. Regulator Co.
* Foster Engineering Co.
* Illinois Engineering Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Plug
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville (Inc.)

Valves, Radiator
* American Radiator Co.
* Crane Co.
* Dean, Payne (Ltd.)
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Radiator, Packless
* American Radiator Co.

Valves, Reducing
* Davis, G. M. Regulator Co.
Elliott Co.
* Foster Engineering Co.
* Kieley & Mueller (Inc.)

Valves, Regulating
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Foster Engineering Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Simplex Valve & Meter Co.

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Foster Engineering Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Stop & Check
(See Valves, Non-Return)

Valves, Superheated Steam (Steel)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Illinois Engineering Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Thermostatically Operated
* Dean, Payne (Ltd.)

Valves, Throttle
* Crane Co.
* Hooven, Owens, Rentschler Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Ventilating Systems
* American Blower Co.
Clarage Fan Co.

Vibration Indicating Machines
* Vibration Specialty Co.

Voltmeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Vulcanizers
* Bigelow Co.
* Farrel Foundry & Machine Co.

Wash Bowls
Manufacturing Equipment & Engrg. Co.

Water Cinder Mills
(See Mills, Cinder, Water)

Water Circulators, Filters, Gages Heaters, Meters, Strainers, etc.
(See Circulators, Filters, Gages Heaters, Meters, Strainers, etc., Water)

Water Columns
* Ashton Valve Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Water Purifying Plants
International Filter Co.
* Loomis-Manning Filter Distributing Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
Brinckerhoff, H. Gordon Co.
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Water Tube Boilers
(See Boilers, Water Tube)

Water Wheels
(See Turbines, Hydraulic)

Waterbacks, Furnace
Green Engineering Co.

Waterproofing Materials
* Johns-Manville (Inc.)
Texas Co.

Wattmeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Welding and Cutting Work
Linde Air Products Co.

Welding Equipment, Electric
* General Electric Co.

Wheels, Polishing Paper
Rockwood Mfg. Co.

Whistles, Steam
* Ashton Valve Co.
Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Winches
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Mundy, J. S. Hoisting Engine Co.

Windlasses
Mundy, J. S. Hoisting Engine Co.

Wire, All Metals
Driver-Harris Co.

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Bronze
Phosphor Bronze Smelting Co.

Wire, Flat
* Roebling's, John A. Sons Co.

Wire, Iron and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* General Electric Co.
* Roebling's, John A. Sons Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

Wood Working Machinery
Pryibil, P. Machine Co.

Worm Gear Drives
* Cleveland Worm & Gear Co.
* Foote Bros. Gear & Mach. Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A., Fdy. & Mach. Co.

Wrenches
*Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

what it is; also discusses boiler room, cooling towers and auxiliaries.

REFRIGERATION

Generation and Utilization of Cold. The Generation and Utilisation of Cold. Engineering, vol. 114, no. 2964, Oct. 20, 1922, pp. 498–500. Abstract of discussion at joint meeting of Faraday Soc. and Brit. Cold Storage and Ice Assn., including following notes: Refrigeration and Inversion Points, A. W. Porter; The Lowest Temperature Yet Attained, Kamerlingh Onnes; The Leiden Cryogenic Laboratory; C. A. Crommelin; Ethyl Chloride C_2H_5Cl, C. Frewen Jenkin; Some Materials of Low Thermal Conductivity, Ezer Griffiths; etc.

RIVETING

Machines for. Riveting Machines (Les machines à river), A. Lambrette. Technique Moderne, vol. 14, nos. 9 and 10, Sept. and Oct. 1922, pp. 374–379 and 418–421, 21 figs. Describes hydraulic, hydroelectric, electric, pneumatic and percussion riveters, their construction and operation, and advantages and disadvantages. Bibliography.

ROLLING MILLS

Nickel. Builds New Plant To Centralize Nickel Rolling Operations. Iron Trade Rev., vol. 71, no. 18, Nov. 2, 1922, pp. 1213–1216, 6 figs. Describes new rolling mills of International Nickel Co., largest nickel rolling mill in United States. Equipment is almost identical with that employed for rolling steel.

S

SAND BLAST

Cleaning Machine Parts. Cleaning of Machine Parts by Sand Blasting. Can. Foundryman, vol. 13, no. 10, Oct. 1922, pp. 22–23 and 25, 3 figs. Discusses variety of application, mechanical handling and screening of sand, exhaust system and automatic equipment.

SCREW MACHINES

Design and Operation. The Design and Operation of Screw-Cutting Machines (Ueberblick uber Bauart und Wirkungsweise von Gewindeschneidmaschinen), Fr. Maier. Maschinenbau (Betrieb), vol. 1, no. 12–13, Sept. 23, 1922, pp. 753–757, 18 figs. Useful field of different described machines and comparison of cutting tools and drives.

SCREW THREADS

Worm. The Normal Chordal Thickness of a Worm Thread, A. Fisher. Machy. (Lond.), vol. 21, no. 528, Oct. 26, 1922, pp. 118–119. 4 figs. Points out that problem of determining normal is not same as determining minimum chordal thickness, and that common term, normal thickness, appears to have different interpretations.

SEAPLANES

F-5-L Boat. F-5-L Boat Seaplane—Performance Characteristics, W. S. Diehl. Nat. Advisory Committee for Aeronautics Tech. Notes, no. 118, Oct. 1922, 8 pp., 8 figs. Notes on wing characteristics, resistance and velocity, engine and propeller characteristics, power chart and indicated performance, cruising and calculated performance.

[See also FLYING BOATS.]

SEMI-DIESEL ENGINES

Solid-Injection. A Semi-Diesel Engine. Mar. Engr. & Naval Architect, vol. 45, no. 541, Oct. 1922, pp. 396–398, 2 figs. New marine-type solid-injection engine, manufactured by Norris, Henty & Gardners, Ltd., and built in powers from 10½ to 134 b.hp.

SHAFTS

Engine, Oscillation of. The Forces of Inertia and Natural Oscillation Coefficients of Engine Shafts (Trägheitskräfte und Eigenschwingungszahlen von Maschinenwellen), W. Kummer. Schweizerische Bauzeitung, vol. 80, no. 11, Sept. 9, 1922, pp. 119–120, 3 figs. Calculation of bending, torsional and elongation oscillations without aid of differential equations.

SHAPERS

Table Supports. Shaper Table Supports, Fred Horner. Machy. (N. Y.), vol. 29, no. 3, Nov. 1922, pp. 178–183, 17 figs. Devices employed by various manufacturers to counteract downward thrust of cut.

SPRINGS

Automobile. Four New Methods in Spring Production, J. Edward Schipper. Automotive Industries, vol. 47, no. 17, Oct. 26, 1922, pp. 821–823, 7 figs. Describes production system of American Auto Parts Co.

Helical. Helical Springs (Ressorts en hélice cylindrique), — Reynal. Arts et Métiers, vol. 75, no. 24, Sept. 1922, pp. 272–279, 2 figs. Discusses theory and formulas for elasticity, torsion, flexure, loads, and gives table of data including cross sections, loads and flexures.

STANDARDIZATION

Germany. Industrial Standards in Germany, H. O. Herzog. Am. Mach., vol. 57, no. 18, Nov. 2, 1922, pp. 683–685. Work of establishing is under direction of central committee and has been in progress for 4½ years. International coöperation desired.

International. International Standardization, P. G. Agnew. Am. Mach., vol. 57, no. 17, Oct. 26, 1922, pp. 633–638, 1 fig. Process of industrial standardization is classified into four stages, namely, by individual firms, by societies or associations, on national scale, and on international scale. Points out obstacles in way of development of international standardization.

STANDARDS

German N. D. I. Report. Report of the German Industrial Standards Committee (Normenausschuss der Deutschen Industrie). Maschinenbau, vol. 1, no. 12–13, Sept. 23, 1922, pp. 777–781, 6 figs. Proposals of the Board of Directors for mandrels for insulating handles and buttons, insulating handles and buttons for nominal voltages up to 750 volts. Proposed standards for medium, fine and coarse threads.

STEAM

High-Pressure. Experimental Results with Steam at High Pressures and Temperatures (Sui risultati sperimentali relativi all'impiego del vapore ad alte pressioni ed alte temperature e sulle loro conseguenze), Gaetano Ivaldi. Industria, vol. 36, no. 18, Sept. 30, 1922, pp. 343–346. Discusses experiments of Schmidt with steam at high pressures and temperatures and makes calculations to show some errors.

STEAM ENGINES

High-Pressure. High Pressure Steam Engines (Über die Höchstdruckdampfmaschine und ihre Bedeutung für den vereinigten Kraft- und Wärmebetrieb), Hermann Franke. Zeit. für angewandte Chemie, vol. 35, no. 71, Sept. 5, 1922, pp. 485–489. Describes steam engine of Schmidt Superheat Co., working under steam pressure of up to 60 atmos. and discusses in detail new conditions due to high pressure.

Patent Specifications. Steam-Engines, Kinds or Types of, and Details Not Otherwise Provided For (including Steam and Other Fluid-Pressure Hammers and Presses). Abridgments of Specifications, Class 122 (iii), period 1909–15, 1922, 174 pp. Patents for inventions.

Portable. The Care and Maintenance of Small Steam Portable Engines (Die Wartung und Instandhaltung kleiner Dampflokomobilen), Hugo Schnell. Zeit. des Bayerischen Revisions-Vereins, vol. 26, nos. 17, 18 and 19, Sept. 15, 30 and Oct. 15, 1922, pp. 138–140, 146–147 and 155–157, 8 figs. Notes on attendance of water level, feed, furnace and auxiliary parts, smoke box, etc.; cleaning and maintenance. Suggestions for selection of portable engine.

Uniflow. A Unaflow Engine with Single-Beat Poppet Valves. Power, vol. 56, no. 20, Nov. 14, 1922, pp. 766–767, 4 figs. Design and method of setting valves of Chuse uniflow engine, which employs light single-beat steam valves and has novel means of providing additional clearance volume in case vacuum is lost.

Auxiliary Exhaust Valves on Unaflow Engines. Power, vol. 56, no. 19, Nov. 7, 1922, pp. 718–719, 6 figs. Describes Skinner unitlow-engine valve gear and method of setting valves.

STEAM GENERATORS

Electric. Generating Steam by High Voltage Current. Can. Machy., vol. 28, no. 17, Oct. 26, 1922, p. 18, 1 fig. Describes "electro" steam generator constructed by F. T. Kaelin and developed by Elec. Furnace Construction Co., Phila.

Steam From Electricity. Can. Min. Jl., vol. 43, no. 43, Oct. 27, 1922, pp. 735–736. Reviews recent developments in steam production by electricity.

Steam Generators. Abridgments of Specifications, class 123 (ii), period 1909–15, 1922, 321 pp. Patents for inventions.

STEAM POWER PLANTS

Fuel Economy in. Fuel Economy in Steam Power Plants, John B. C. Kershaw. Beama, vol. 11, no. 5, Nov. 1922, pp. 745–752, 2 figs. Control of combustion process.

STEAM TURBINES

Steam Consumption. The Steam Consumption of Steam Turbines (Der Dampfverbrauch fon Dampfturbinen), G. Forner. Zeit. des Vereines deutscher Ingenieure, vol. 66, nos. 40 and 43–44, Oct. 7 and 28, 1922, pp. 955–958 and 1025–1026, 10 figs. Approximate formulas for calculation of steam consumption of most important types of turbines without use of entropy or steam charts. Approximate formulas for calculation of saturation temperature of steam.

Types. Turbine Installation (Turbinenanlagen), Constantin Redzich. Warme- u. Kälte-Technik, vol. 24, no. 19, Oct. 1, 1922, pp. 224–226. Principles of various types; difference in steam admission; turbocompressors; marine turbines; regards turbine as steam engine of future.

STEEL CASTINGS

Manufacture. Notes on the Development of the Manufacture of Steel Castings, F. A. Melmoth. Foundry Trade Jl., vol. 26, no. 324, Nov. 2, 1922, pp. 355–358, 2 figs. Various methods and operations in production of medium-weight and light castings.

STEELS

Automobile. Steels for Automobile Construction, Benno R. Dierfeld. Iron Age, vol. 110, no. 19, Nov. 9, 1922, pp. 1199–1203. Standardized steel specifications of German automotive industry; what various symbols and designations signify.

Steel Requirements of the Automotive Industry, Henry Chandler. Iron Age, vol. 110, no. 18, Nov. 2, 1922, pp. 1136–1137. Classified as to various parts. Test for mechanical properties; importance of heat treatment. (Abstract.) Paper read before Am. Iron & Steel Inst. See also Iron Trade Rev., vol. 71, no. 18, Nov. 2, 1922, pp. 1192–1194 and 1205, 2 figs. and Blast Furnace & Steel Plant, vol. 10, no. 11, Nov. 1922, pp. 544–548, 2 figs.

Non-Metallic Inclusions in. Non-Metallic Inclusions and Ferrite Segregation in Steel, E. G. Mahin and H. W. Botts. Chem. & Met. Eng., vol. 27, no. 20, Nov. 15, 1922, pp. 980–985, 11 figs. Traces of manganese and sulphides are present in steel surrounding sulphide inclusion, and cause precipitation of ferrite shells; such tiny inclusions have much to do with locus of excess ferrite.

Structure. The Structure of Steels from the Standpoint of Colloid Chemistry, F. C. A. H. Lantsberry. Soc. Chem. Industry—Jl., vol. 41, no. 19, Oct. 16, 1922, pp. 409R–411R, 8 figs. Deals with existence of non-metallic enclosures in steel, which are divided into two classes, namely, those which are solid above temperature of fusion of steel (certain slags and alumina), and those which have melting point below that of steel (sulphides).

Titanium in. Determination of Titanium in Steels. Chem. Trade Jl. & Chem. Engr., vol. 71, no. 1848, Oct. 20, 1922, pp. 479–480. Describes new rapid volumetric method worked out by L. Losana and E. Carozzi; method of reduction and manipulative details. Translated from Giornale di Chimica Industriale ed Applicata, Sept. 1922.

STEEL, HEAT TREATMENT OF

Bath. Heat Treating Bath Composed of Sodium Chloride, Sodium Carbonate, and Sodium Cyanide, E. V. Schaal. Air Service Information Circular, vol. 4, no. 363, Aug. 15, 1922, 4 pp., 6 figs. Mixture of 40 per cent sodium chloride and 60 per cent sodium carbonate is found to decarburize steel considerably, but this decarburizing tendency is neutralized by addition of about 15 per cent of sodium cyanide.

Machine Parts. Heat Treatment of Steel for Machine Construction (Värmebehandlingen av stål för konstruktionsändamål), Arvid Johansson. Teknisk Tidskrift, vol. 52, nos. 25 and 29, June 23 and July 22, 1922, pp. 407–409 and 469–472. Properties of steels and their various treatments for different machine parts.

STEEL MANUFACTURE

Power Economy. Industry Needs Power Economy, E. F. Entwisle. Iron Trade Rev., vol. 71, no. 18, Nov. 2, 1922, pp. 1201–1202 and 1205–1206. Points out that plants have not kept pace with increased demands made during peak-load periods; effort should be made to eliminate wasteful steam plants; electrification appears economical. Paper presented before Am. Iron & Steel Inst. See also Blast Furnace & Steel Plant, vol. 10, no. 11, Nov. 1922, pp. 585–587.

Problems. Auxiliary Problems in Steel Making. Iron Age, vol. 110, no. 19, Nov. 9, 1922, pp. 1211–1216, 2 figs. Abstracts of following papers presented before Am. Iron & Steel Inst.: Heating Furnaces for Blooms, Slabs and Billets, W. P. Chandler, Jr.; Power Plants in the Steel Industry, E. F. Entwisle; Fluorspar and Its Uses, G. H. Jones.

STEEL WORKS

Duluth, Minn. From Ore to Nails in Minnesota Plant, Gilbert L. Lacher. Iron Age, vol. 110, no. 17, Oct. 26, 1922, pp. 1057–1061, 8 figs. Steel corporation adds rod mill and wire plant to its Duluth works; labor-saving devices and safety measures.

England. The Story of Hadfields, Limited. Iron & Steel of Canada, vol. 5, nos. 10 and 11, Oct. and Nov. 1922, pp. 179–186 and 193–205, 10 figs. Oct.: Discusses Hadfield research work including manganese steel, low-hysteresis steel, nickel-chromium steel, and describes East Hecla Works and equipment, reconstruction and post-war work, electric furnaces, etc. Nov.: Description of 28-in. reversing mill; 11-in. and 14-in. rolling mills; Hadfields work during war, including production of armament material.

Fuel Problems. Some Fuel Problems of the Steel Plant, E. E. Litt. Eng. Jl. (Eng. Inst. Can.), vol. 5, no. 11, Nov. 1922, pp. 533–536. Review of requirements and distribution of all available fuels.

Reconstruction. Reconstruction and Enlargement of Steel Works Without Interruption of Work (Umbau und Vergrösserung von Stahlwerken ohne Unterbrechung des Betriebes). Giesserei-Zeitung, vol. 19, no. 41, Oct. 17, 1922, pp. 603–605, 8 figs. Describes reconstruction of basic steel works in Lorraine, including installation of a new converter, reconstruction of chimney, etc.

STOKERS

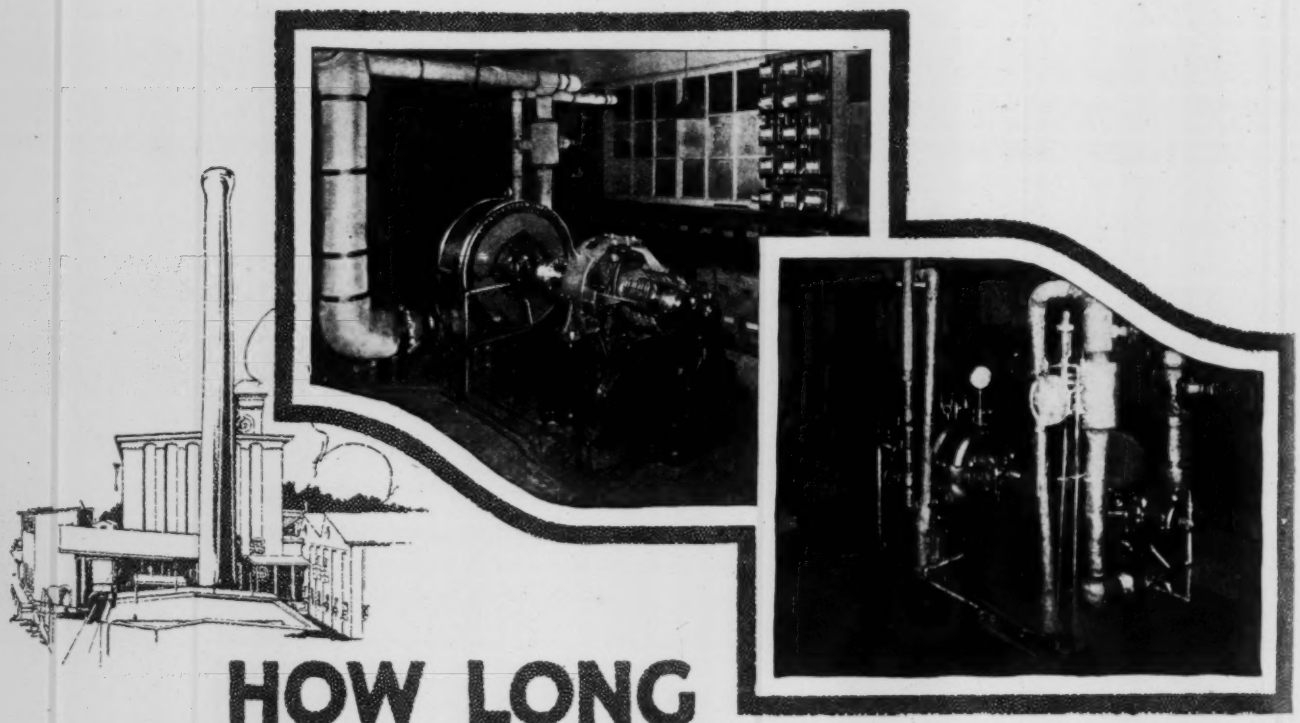
Coal-Mine Power Plants. Mechanical Stokers as Applied to Coal Mine Power Plants, Ollison Craig. Coal Industry, vol. 5, no. 10, Oct. 1922, pp. 444–445, 4 figs. Points out that by use of mechanical stokers coal mines can effect considerable economies; low-grade fuel can be used and labor expense reduced. Economy of typical installations.

Locomotive. The du Pont-Simplex Locomotive Stoker. Ry. Mech. Engr., vol. 96, no. 11, Nov. 1922, pp. 659–661, 5 figs. Also Ry. Age, vol. 73, no. 18, Oct. 28, 1922, pp. 809–811, 4 figs. Describes design of stoker developed by Standard Stoker Co., N. Y., and its operation.

Pluto. The Pluto Stoker (Der Plutorost), H. Pradel. Wärme- u. Kälte-Technik, vol. 24, no. 19, Oct. 1, 1922, pp. 221–223, 7 figs. Reviews developments in mechanical stoking and describes improved type of Pluto stoker.

Underfeed. The Development of Multiple Retort Inclined Underfeed Stokers, Edwin Lundgren. Combustion, vol. 7, no. 5, Nov. 1922, pp. 258–264, 14 figs. Brief outline of development to date and discussion of trend of design to meet present and future central-station demands.

Underfeed Stokers Burn Low Grade of Coal, C. E. Reese. Blast Furnace & Steel Plant, vol. 10, no. 11, Nov. 1922, pp. 588–591, 7 figs. Underfeed stokers



HOW LONG SHOULD A TURBINE LAST?

WHILE the life of any piece of mechanical equipment depends to a large extent on the care and attention it receives, its potential life depends upon materials and design. The illustration at the top shows a Terry Lighting Set installed in 1911 at the plant of Joseph Benn Sons, Inc. There were no shutdowns or repairs until it was overhauled in 1921 when the glands, bearings and wheel were replaced.

The Terry Boiler Feed Unit illustrated at the right was installed in 1912, a new wheel was all that was necessary when it was overhauled in 1921. By replacing these worn parts they have practically restored the turbines to their original condition. Dividing the cost of these repairs by the number of years in operation shows an exceptionally low upkeep cost per year, thus it is possible to prolong the life of the Terry Turbine indefinitely by replacing the few wearing parts. This is an important item to bear in mind when considering the first cost of your Steam Turbine.

Bulletin A-25 describes in detail the wearing parts and shows their accessible arrangement in the Turbine. Write for it and you can easily see you are making a permanent investment when you buy

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specially designed to burn low-grade fuel installed under 5600 sq. ft. of boilers; plant operates at high rating and high efficiency.

STREET RAILWAYS

Track. Calculation of Street Railway Track for Wheel Pressure at Rest and in Motion (Die Berechnung des Strassenbahngleises auf ruhenden und rollenden Raddruck), H. Bloss. Verkehrstechnik, vol. 39, nos. 39 and 41, Sept. 29, and Oct. 13, 1922, pp. 489-493 and 510-516, 11 figs. Discusses ballast and ballasting, dependence of rail depression on ballast, and gives table of figures.

SUPERHEATERS

Steam Separators and. Steam Separators and Superheaters. Abridgments of Specifications, class 123 (iii), period 1909-15, 1922, 134 figs. Patents for inventions.

Types. Superheated Steam and Superheaters, W. Erskine Dommett. Eng. Rev., vol. 36, no. 1, July 1922, pp. 4-7, 8 figs. Advantages of superheating; requirements to be met; describes representative types of superheaters, including Foster, Sugden, Bolton and Stirling types.

T

TEMPERATURE MEASUREMENT

Temperature-Heat-Content Diagram. Temperature-Heat-Content Diagram for Thermodynamic Examination of Machines Following the Gas Laws (Ein Temperatur-Wärmemengen-Diagramm als Hilfsmittel zur thermodynamischen Untersuchung von Maschinen, deren Arbeitsmittel die Gasgesetze befolgen), Emil Wellner. Dinglers Polytechnisches Journal, vol. 337, no. 14, July 15, 1922, pp. 143-149, 6 figs. Single- and multiple-stage piston compressors; turbo-compressors; gas turbines; etc.

TESTING MACHINES

Hydraulic, for Welded Steel Pipe. Hydraulic Testing Machine for Welded Steel Pipes. Engineering, vol. 114, no. 2966, Nov. 3, 1922, p. 565, 4 figs. Describes machine capable of testing pipes up to 6-ft. diam. to pressure of 450 lb. per sq. in.; was built from 2500-ton shell piercing press.

Modern. Modern Testing Equipment. Eng. Production, vol. 5, no. 107, Oct. 19, 1922, pp. 378-379, 4 figs. Notes on recent developments by firm of Joshua Buckton & Co., Ltd., Leeds, England.

TESTS AND TESTING

Foundry Experimental Stations. Duties and Organization of Experimental Stations in Foundries and Metallurgical Works (Aufgaben und Organisation der Versuchsanstalt in Giessereien und Hüttenwerken), E. H. Schulz. Giesserei-Zeitung, vol. 19, no. 39, Oct. 3, 1922, pp. 571-574, 6 figs. Historical review of development; mechanical equipment and organization. Details of experimental station of German-Luxembourg Min. & Met. Corp., Dortmunder Union Dept., as example of modern installation.

TEXTILE MACHINERY

Manufacture. The Manufacture of Textile Machinery Components. Machy. (Lond.), vol. 21, no. 525, Oct. 19, 1922, pp. 73-80, 11 figs. Methods employed by Dobson & Barlow, Ltd., Bolton, England.

THERMIT WELDING

Street-Railway Shops. The Use of Thermit Welding in Street Railway Shops, J. H. Deppeler. Am. Welding Soc. Jl., vol. 1, no. 8-9, Aug.-Sept. 1922, pp. 29-31, 3 figs. Making special work by means of thermit welding; making compromise joints; motor cases and truck frames.

THERMODYNAMICS

Nernst's Heat Law. Nernst's New Heat Theory (Der neue Wärmesatz von Nernst), H. Schmolke. Archiv für Wärmewirtschaft, vol. 3, no. 9, Sept. 1922, pp. 165-169, 1 fig. Mathematical derivation of heat law, its general applicability and practical importance.

TIME STUDY

Day Work Shop. Time Study in the Day Work Shop, Howard W. Dickson. Indus. Management (N. Y.), vol. 64, no. 5, Nov. 1922, pp. 262 and 318. By installing time-study methods, records kept show average increased production of 50 per cent accompanied by lowering of costs in spite of increased payroll.

TIRES, RUBBER

Raw Rubber Content. The Raw Rubber Content of Tyres. India-Rubber Jl., vol. 64, no. 18, Oct. 28, 1922, p. 19. Points out fallacy existing in idea that to improve wearing qualities of his goods manufacturer has only to add some more rubber to his compound.

Stresses and Wear in. Stresses and Wear in Automobile Tires, Otto Enoch. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 438-443, 12 figs. Presents experimental evidence in support of view that tire losses are due to work expended in tire deformation. Abstracted and translated from Motorwagen, Sept. 10, 20 and 30, 1921, with comment by Research Dept. included.

TOLERANCES

German Standards. The Introduction of the New DI Standard Allowances in Fine Mechanics and the Economic Limits for Their Application (Die Einführung der neuen DI-Norm-Passungen in die feinmechanische Technik und die wirtschaftlichen Grenzen bei der Anwendung), G. Leifer. Zeit. für Fernmeldetechnik, vol. 3, nos. 5 and 6, May 16 and June 16, 1922, pp. 68-75 and 89-92, 34 figs. Discusses application of allowance system developed by the German Industry Committee on Standards (NDI) to precision tools.

TOOLS

Small, Standardization of. Standardization of Small Tools, Carl J. Oxford. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 721-723 and 777, 2 figs. How first cost of small tools can be greatly lowered, without sacrificing their efficiency, by adoption of standards that will permit their manufacture on quantity basis.

TRACTORS

Ordnance. Ordnance Automotive Development Since 1918, Burton O. Lewis. Army Ordnance, vol. 3, no. 14, Sept.-Oct. 1922, pp. 91-98, 9 figs. Discusses tractors and track-laying vehicles.

Steam. The Schneider Locotractor (Les Locotracteurs Schneider). Révue Générale des Chemins de Fer, vol. 41, no. 4, Oct. 1922, pp. 219-224, 4 figs. Describes 10-ton and 15-ton types for narrow gage and center gage; details of construction and dimensions; fuel consumed is 1/6 or 1/8 of coal of steam locomotive.

TRADE UNIONS

Power and Irresponsibility. Labor Unions—Their Power and Irresponsibility, L. F. Loree. Ry. Rev., vol. 71, no. 18, Oct. 28, 1922, pp. 590-592. Suggests plan for governmental oversight of labor unions. Address before Am. Bankers' Assn.

V

VALVES

Standards for. Report of the German Industry Committee on Standards (Mitteilungen des Normenausschusses der Deutschen Industrie). Maschinenbau, vol. 1, no. 11, Sept. 9, 1922, pp. 715-735, 21 figs. Proposed standards for straight-way valves.

VENTILATION

Department Stores. A Study in Department Store Ventilation, J. M. Robb. Heat. & Vent. Mag., vol. 19, no. 10, Oct. 1922, pp. 40-43, 5 figs. Describes new methods for eliminating dust and providing for proper air diffusion, taking department stores as example.

VENTURI METERS

Disk and. Volume Measurements of Liquid and Gaseous Substances, Especially in Large Pipes (Mengenmessungen flüssiger und gasförmiger Stoffe, insbesondere in grossen Rohrleitungen), P. Thiem. Siemens-Zeit., vol. 2, no. 10, Oct. 1922, pp. 482-494, 17 figs. Notes on disk water meters with mechanical registration and boiler-feed disk meters; venturi meters, their development and applications to measurement of water, gases and steam.

VOCATIONAL EDUCATION

Developments. Vocational Education. Monthly Labor Rev., vol. 15, no. 4, Oct. 1922, pp. 110-112. Industrial rehabilitation in Wisconsin; vocational guidance in Alsace and Lorraine.

W

WAGES

Analysis. Wage Analysis, R. von Huhn. Management Eng., vol. 3, no. 5, Nov. 1922, pp. 307-310, 3 figs. Graphical method which eliminates influence of extreme cases.

Group-Bonus System. Group-Bonus Wage-Incentive Plan, E. Karl Wennerlund. Soc. Automotive Engrs. Jl., vol. 11, no. 5, Nov. 1922, pp. 402-406, 4 figs. Group-bonus plan is explained and application of group standard time is discussed, supplemented by tabular data. Experience with and conditions favorable to grouping. See also (abstract) in Automotive Industries, vol. 47, no. 18, Nov. 2, 1922, pp. 855-858.

Hours of Labor and. Wages and Hours of Labor. Monthly Labor Rev., vol. 15, no. 4, Oct. 1922, pp. 59-69. Wages and hours in woolen and worsted industry; wages and cost of living in Aden, Arabia; average earnings per shift in German coal and lignite mines; railway shopmen's wages in Great Britain; 48-hour week in British industry.

WASTE ELIMINATION

Metal Industry. Waste and Inefficiency in the Metal Industry, A. J. G. Smout. Metal Industry (Lond.), vol. 21, nos. 17 and 18, Oct. 27 and Nov. 3, 1922, pp. 385-387 and 409-412. Economics of metallurgy. Losses in tin metallurgy; recovery of tin from waste products; zinc losses; coal conservation; froth flotation of coal; efficiency of turbo-alternator.

WASTE HEAT

Utilization. Utilization of Waste Heat in Industrial Plants (Ueber Abwärmeverwertung in Industrieanlagen), Leo Walter. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 74, no. 40-42, Oct. 20, 1922, pp. 185-191, 17 figs. Application to heating feedwater, steam production, drying, heating, etc., and description of apparatus used.

Waste-Heat Utilization in Gas Works (Abhitzverwertung auf Gaswerken), H. Voss. Gas- u. Wasserfach, vol. 65, no. 37, Sept. 16, 1922, pp. 585-588, 6 figs. Account of experiences with waste-heat boiler plant in gas works of Quedlinburg, Germany.

Waste Heat Utilization in Dairy Plants (Gedanken und Vorschläge über Abwärmewirtschaft in milchwirtschaftlichen Betrieben), Albert Fischer. Technische Blätter, vol. 12, nos. 2 and 3, Jan. 14 and 21, 1922, pp. 10-15 and 25-27, 4 figs. Suitable boilers for dairy purposes; efficiency of boiler installatic is; heating of milk; possiblities of waste heat in butter making.

WASTE RECLAMATION

Factories. Waste Recovery as a Profit-Maker. Factory, vol. 29, no. 5, Nov. 1922, pp. 526-528, 562, 564 and 566, 4 figs. Points out that best way to handle problem of waste is through a definite centralized staff department of waste and salvage.

WATER POWER

Federal Power Act. The Operation of the Federal Water Power Act, O. C. Merrill. Am. Soc. Civ. Engrs.—Proc., vol. 48, no. 9, Nov. 1922, pp. 1758-1765. Discusses essential features and fundamental basis of statute passed by Congress in 1920, manner in which it is operating and results that are being accomplished.

Social and Economic Aspects. Social and Economic Aspects of Hydro-Electric Power, Charles D. Marx. Am. Soc. Civ. Engrs.—Proc., vol. 48, no. 9, Nov. 1922, pp. 1781-1787. Writer seeks to present facts demonstrating important role which it is playing and will continue to play as factor in human development.

WAVE POWER

Transmission. Wave Power Transmission, W. Dinwoodie. North-East Coast Instn. Engrs. & Shipbuilders, advance paper, no. 2339Q, for meeting Oct. 27, 1922, 13 pp., 9 figs. Discussion of theory and description of practical machines and appliances which are outcome of these considerations.

WELDING

Butt. Butt Welding, W. Remington. Am. Welding Soc. Jl., vol. 1, no. 8-9, Aug.-Sept. 1922, pp. 84-93. Deals with slow butt method, flash method, and part flash part slow butt method.

Cast Iron. Cast Iron Welding. Am. Welding Soc. Jl., vol. 1, no. 8-9, Aug.-Sept. 1922, pp. 37-46, 17 figs. Notes on field for cast-iron welding; control of composition and characteristics of iron castings; influence of impurities on properties of cast iron; factors affecting cast-iron welds. Joint report of electric arc, gas and thermit welding research committee of Am. Bur. of Welding.

Hyde Process. Adaptability of the Hyde Welding Process to Steel Engine Cylinder Construction, E. V. Schaal. Air Service Information Circular, vol. 4, no. 364, Aug. 15, 1922, 4 pp., 5 figs. To determine feasibility of Hyde welding process and its effect upon structures of 1020 and 1045 steel, with view toward adoption for engine-cylinder construction.

Rail Joints. Cast Welded Joints in Brooklyn, G. H. McKelway. Elec. Ry. Jl., vol. 60, no. 17, Oct. 21, 1922, pp. 660-662, 6 figs. Describes method of making cast welded joints in girder rail in paved streets.

Street-Railway Cars. Welding for the Maintenance of 1600 Street Railway Cars, J. S. McWhirter. Am. Welding Soc. Jl., vol. 1, no. 8-9, Aug.-Sept. 1922, pp. 25-28. Author records experience on Third Avenue Ry. System of New York.

[See also ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE; OXY-ACETYLENE WELDING; THERMIT WELDING.]

WIND TUNNELS

McCook Field. Description of McCook Field 5-Foot Wind Tunnel, E. N. Fales. Air Service Information Circular, vol. 4, no. 341, Mar. 15, 1922, 9 pp., 9 figs. New wind tunnel of Air Serivice Engineering Division has for object to afford more convenient aerodynamic testing facilities. Notes on cost of plant, power plant, power economy, general shape, experimental portion, balances, propellers, measurement of velocity etc.

WOOD PRESERVATION

Decaying Roofs. The Preservation of Decaying Wood Roofs, Wendell S. Brown. Mech. Eng., vol. 44, no. 11, Nov. 1922, pp. 709-712, 6 figs. General theory of wood decay; methods employed in preserving wood roofs; economic considerations in prolonging useful life of repaired roofs. (Abridged.)

WORKMEN'S COMPENSATION

Social Insurance and. Workmen's Compensation and Social Insurance. Monthly Labor Rev., vol. 15, no. 4, Oct. 1922, pp. 167-175. Recent compensation reports; vocational rehabilitation and workmen's compensation; public instruction as to workmen's compensation; the crisis in German social insurance; health and unemployment insurance in Great Britain.

Z

ZINC ALLOYS

Die-Casting. Insuring Permanence in Zinc-Base Die-Casting Alloys, H. E. Brauer and W. M. Peirce. Raw Material, vol. 5, no. 9, Oct. 1922, pp. 337-340, 10 figs. Discusses failures of zinc castings by cracking and swelling, and gives results of experiments to overcome these failures.

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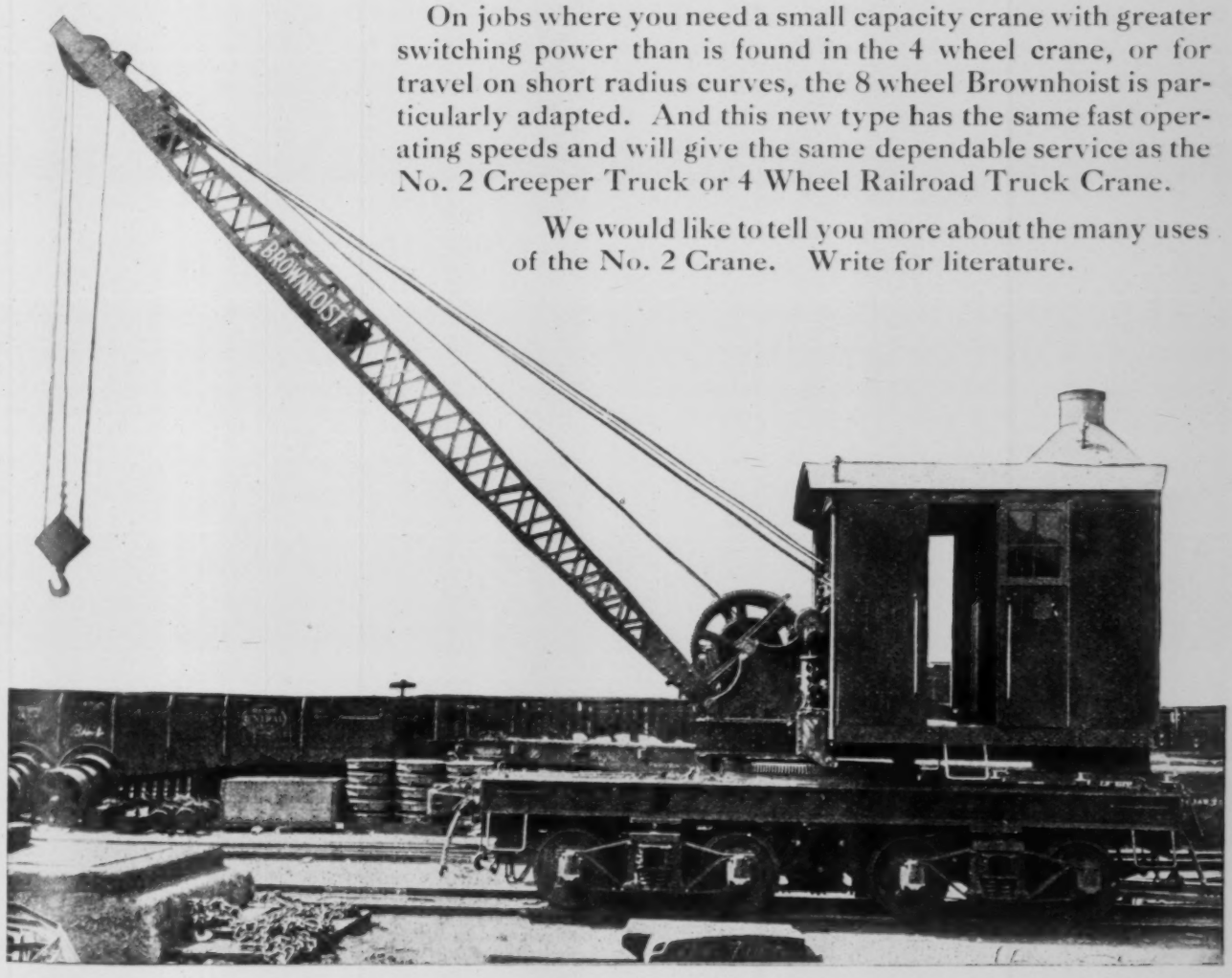
*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Announcing the 8 Wheel No. 2 Brownhoist Railroad Truck Crane

Now, for the first time, you can get a small capacity Brownhoist Locomotive Crane mounted on 8 wheel railroad trucks. With this mounting the No. 2 has greater handling capacities, better traveling facilities and makes an ideal yard crane for the average plant.

On jobs where you need a small capacity crane with greater switching power than is found in the 4 wheel crane, or for travel on short radius curves, the 8 wheel Brownhoist is particularly adapted. And this new type has the same fast operating speeds and will give the same dependable service as the No. 2 Creeper Truck or 4 Wheel Railroad Truck Crane.

We would like to tell you more about the many uses of the No. 2 Crane. Write for literature.



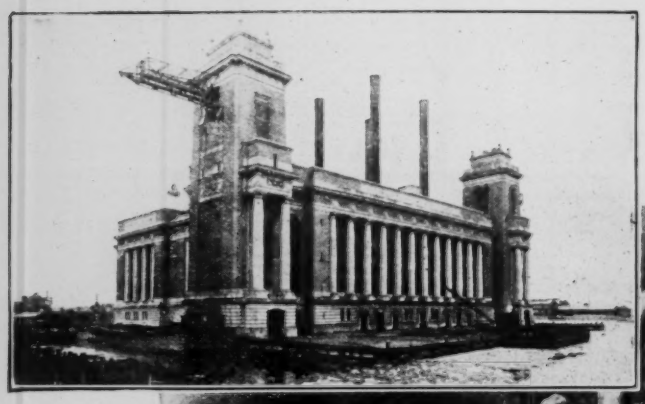
The Brown Hoisting Machinery Co., *Cleveland, O.*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans

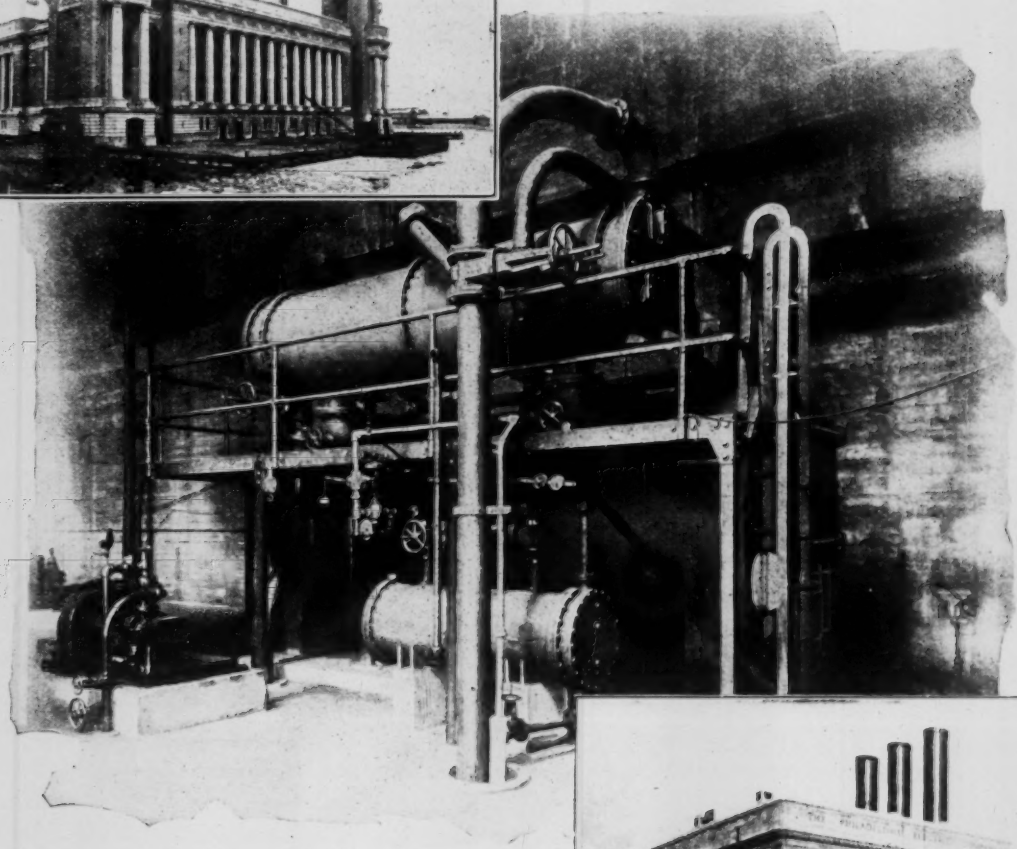
Locomotive Cranes, Buckets, Heavy Dock Machinery, Bridge Cranes, Belt and Chain Conveyors, Bunkers

BROWNHOIST

MATERIAL HANDLING MACHINERY



At left: Chester Station, Philadelphia Electric Co.



One of the 400,000 lb. per hr. Elliott Deaerators installed in the Delaware Plant of the Philadelphia Electric Company. Three such units are now operating in the Delaware Station. Two more are being furnished the Chester Station. At right:—Delaware Station.

Deaeration at Delaware and Chester Stations

Deaeration has made good for the Philadelphia Electric Company. Additional installations are substantial evidence of this fact. Within a week after the second Deaerator unit had been put into operation at the Delaware Station, three more units were ordered.

Deaeration pays. At the Delaware Station for instance,—by reducing the temperature of the boiler feed water entering the economizers from 210° to 140°, a saving is effected, which it is figured will pay for the Deaerators inside of two years.

Full information regarding the application of Elliott Deaerators in power plants will gladly be furnished on request.

N-775

Condensers
Air Ejectors
Deaerators
Twin Strainers
Twin Filters
Feed Water Heaters
Steam Separators
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THE ENGINEERING INDEX

(Registered United States, Great Britain and Canada)

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

Photoprint copies (white printing on a black background) of any of the articles listed in the Index may be obtained at a price of 25 cents a page. When ordering photoprints identify the article by quoting from the Index item: (1) Title of article; (2) Name of periodical in which it appeared; (3) Volume, number, and date of publication of periodical; (4) Page numbers. A remittance of 25 cents a page should accompany the order. Orders should be sent to the Engineering Societies Library, 29 West 39th Street, New York.

(See also page 150 of this issue for supplementary items.)

ABRASIVE WHEELS

Testing. Testing Abrasive Wheels, H. H. Lavercombe. Am. Mach., vol. 57, no. 25, Dec. 21, 1922, pp. 961–962, 2 figs. Characteristics of wheels used for different purposes; machines for testing hardness of bond and abrasive qualities of wheels.

ACCIDENT PREVENTION

Education in. A Program of Education in Accident Prevention, with Methods and Results, E. George Payne. U. S. Bur. of Education, Bul. no. 32, 1922, 54 pp., 11 figs. History, need and method of education, method of procedure in accident prevention; necessity for analysis of accident situation in each community as basis for school instruction. Bibliography.

AIR COMPRESSORS

High-Speed. British High-Speed Air Compressors, F. Johnstone-Taylor. Iron & Coal Trades Rev., vol. 105, no. 2851, Nov. 10, 1922, pp. 683–687, 10 figs. Modern types discussed and analyzed.

Hydraulic. The Hydraulic Air-Compressor at Victoria Mine, Michigan, J. J. Bebeau. Mich. Technic, vol. 35, no. 4, May 1922, pp. 13–17, 3 figs. Describes installation of Taylor air compressor for supplying power from Ontonagon River; diverting dam and canal; construction, operation, capacity, efficiency and cost of plant.

Testing. Testing Air Compressors, William Reavell. Engineer, vol. 134, no. 3492, Dec. 1, 1922, pp. 586–587, 5 figs. Also Engineering, vol. 114, no. 2970, Dec. 1, 1922, pp. 690–691, 4 figs. Points out that no test should be regarded as complete which fails to give (1) net horsepower applied at shaft; (2) volume of air actually delivered, expressed in terms of free air; (3) corrected volume by reducing it to equivalent volume when cooled down to same temperature as that of air aspired. Paper read before Instn. Mech. Engrs.

AIR CONDITIONING

Cooling of Public Buildings. Cooling of Theaters and Public Buildings, Fred Wittenmeier. Refrig. Eng., vol. 9, no. 4, Oct. 1922, pp. 115–118 and 132. Suggestions for design of air-cooling apparatus.

Foundries. Air-Conditioning Installations in Foundries (Luftungstechnische Anlagen in Giessereien), Otto Brandt. Giesserei-Zeitung, vol. 19, nos. 46 and 47, Nov. 21 and 28, 1922, pp. 675–678 and 689–692, 16 figs. Notes on plants and apparatus for absorption of dust, smoke, gases and vapors, flue-gas and exhaust-steam utilization for heating; high-pressure fans and blowers for cupolas, smelting, annealing and hardening furnaces and suction draft installations.

Humidifying and Dehumidifying. Experiments in Air Conditioning of Separate Rooms, Philip Drinker. Heat & Vent. Mag., vol. 19, no. 11, Nov. 1922, pp. 29–31, 5 figs. Humidifying and dehumidifying tests which show usefulness of portable air washers in offices and homes. (Abstract.) Jl. of Indus. Hygiene.

AIR PUMPS

Condenser. Investigations of Air Pumps for Condensers (Untersuchungen an Luftpumpen fur Kondensatoren), K. Hoefer. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 28–29, July 22, 1922, pp. 723–728, 14 figs. Tests with Hoefer type of steam ejectors; influence of steam content of air on vacuum; comparisons of piston air pump and steam ejector, of ejector water air pump and steam ejector, and of piston air pump and water-jet air-suction apparatus, with regard to steam consumption, lubrication, costs, operating safety, weight and space requirements.

AIR SERVICE, UNITED STATES

Functions and Operations. The Army Air Service, Mason M. Patrick. Aviation, vol. 13, nos. 23 and 24, Dec. 4 and 11, 1922, pp. 740–742 and 777–779. Its organization, functions and operations, including distribution of principal units, stations and troops, training schools, flying cadets, supply systems, engineering division, division for collecting aeronautical information, airway development, etc.

AIRCRAFT CONSTRUCTION MATERIALS

Rubber. Rubber as Applied to Aircraft, James Dyer. Rubber Age, vol. 3, no. 9, Nov. 1922, pp. 432–437. Deals with main applications of rubber to heavier-than-air and lighter-than-air craft. Paper read before Instn. Rubber Industry.

AIRPLANE ENGINES

Farman. The Farman 18-cylinder W-type 600-Hp. Airplane Engine (Le moteur d'avion Farman 600 Hp. 18-W.D.). Aeronautique, vol. 4, no. 42, Nov. 1922, pp. 343–348, 9 figs. Detailed description of new engine having three rows of six cylinders in W-form; crankshaft, ignition, lubrication, carburation, electric starting, etc.

AIRPLANES

Aerofoils. The Aerodynamic Properties of Thick Aerofoils—II, F. H. Norton and D. L. Bacon. Nat. Advisory Committee for Aeronautics, Report no. 152, 1922, 15 figs., 25 figs. Investigation for purpose of studying effect of various modifications in given wing section, including changes in thickness, height of lower camber, taper in thickness, and taper in plan form with special reference to development of thick, efficient aerofoils.

All-Metal. The Henri-Paul Metal Airplane of Et. Schneider (L'avion metallique quadrimoteur, type Henri-Paul, des Etablissements Schneider). Genie Civil, vol. 81, no. 23, Dec. 2, 1922, pp. 505–510, 18 figs. Sustaining surface, 220 sq. m.; four Lorraine-Dietrich engines of 400 hp. each; total weight 10,020 kg.; length 300 m.; maximum speed 160 km. per hr.

Controllability and Maneuverability. Controllability and Maneuverability of Airplanes, F. H. Norton and W. G. Brown. Nat. Advisory Committee for Aeronautics, Report no. 153, 1922, 18 pp., 22 figs. Investigation for purpose of studying behavior of *Jn4h* airplane in free flight under action of its controls and from this to arrive at satisfactory definitions and coefficients for controllability and maneuverability. Results are said to be of practical value.

Design. Influence of Design on Cost of Operating Airplanes, Archibald Black. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 821–825 and 849, 12 figs. Curves of operating cost for varying duration, speed, reserve horsepower, etc., are developed. Calculations to illustrate impracticability of requiring twin-engined commercial airplanes to fly on one engine; initial rate of climb of 400 to 500 ft. in first minute is proposed as standard of safe performance.

Dornier. The New Commercial Airplane, Dornier-"Komet"-1922 (Das neue Landverkehrsflugzeug Dornier-"Komet"-1922). Motorwagen, vol. 25, no. 30, Oct. 31, 1922, pp. 579–581. Single-engine, strutless monoplane constructed entirely of steel and duralumin. Characteristics: Engine, 185-hp. BMW3a; span, 17 m.; height, 2.5 m.; weight empty, 1100 kg.; weight loaded, 1830 kg.; surface load, 38.8 kg. per sq. m.; number of passengers, 6; speed, 170 km. per hr.

Flying Boats. See FLYING BOATS.

Gliders. Gliding Flight and the Rhön Competition (Der Segelflug und die Rhön-Segelflug-Wettbewerbe), Wilhelm Hoff. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 45, Nov. 11, 1922, pp. 1037–1040, 15 figs. Definition of gliding flight; static and dynamic gliding; results of Rhön competition; details of most important sailplanes; the French and English competitions.

The Technique of the Rhön (1922) Airplanes (Die Technik der Rhön-Flugzeuge 1922), Roland Eisenlohr. Luftfahrt, vol. 26, no. 10, Oct, 1922, pp. 134–138, 9 figs. Sailplanes with wing steering; the Hawa type; monoplane with duck-shaped hull; open-seated gliders, etc.

Three European Gliding Meets, Edmund T. Allen. Aviation, vol. 13, no. 22, Nov. 27, 1922, pp. 712–714, 1 fig. What can be learned from German, French and English meets held during summer.

Helicopters. See HELICOPTERS.

Landing Fields. Some Errors in Landing Field Layout, Archibald Black. Aviation, vol. 13, no. 21, Nov. 20, 1922, pp. 693–694, 3 figs. Widely published sketches of assumedly ideal field layouts shown to be faulty.

Observation. The Martin Observation Airplane Aviation, vol. 13, no. 24, Dec. 11, 1922, pp. 772–773, 1 fig. Describes MO1, three-seater metal cantilever monoplane, designed for spotting and short distance reconnaisance work; 375-hp. Curtis D12 engine.

Performance. A Preliminary Study of Airplane Performance, F. H. Norton and W. G. Brown. Nat. Advisory Committee for Aeronautics, Technical Notes, no. 120, Nov. 1922, 7 pp., 8 figs. Flight tests on several airplanes for purpose of determining their relative performance with same engine and propeller.

Rudder. The Elimination of Dead Center in the Controls of Airplanes with Thick Sections, Thomas Carroll. Nat. Advisory Committee for Aeronautics, no. 119, Nov. 1922, 3 pp., 2 figs. Describes design of modification of present rudder intended to remedy condition by thickening section sufficiently to fill in zone of turbulent flow and eliminate dead center.

Seaplanes. See SEAPLANES.

Stability. Method for Determining the Longitudinal Stability of Airplanes (Un metodo per la determinazione della stabilita longitudinale dei velivoli), Filippo Burzio. Ingegneria, vol. 1, no. 4, Oct. 1, 1922, pp. 90–93, 3 figs. Results of experiments to determine static and dynamic stability; moment of inertia.

AIRSHIPS

Engines. The German Engine for Airships (Der deutsche Luftschiffmotor), Werner v. Langsdorf. Wirtschaftsmotor, nos. 1, 2 and 3, Jan. 25, Feb. 25 and Mar. 25, 1922, pp. 34–35, 31–34 and 33–34, 7 figs. Earliest developments; difficulties of motor construction; use of Daimler motors, and subsequent Maybach motors and various applications to Zeppelins and other airships; path of fuel, cooling, pumps, etc.

ALCOHOL

Industrial. Industrial Alcohol Production and Uses in the Phillipines, Howard I. Cole. Chem. Age (N. Y.), vol. 30, no. 11, Nov. 1922, pp. 489–492. Sources of alcohol in Tropics; fermentation of molasses; alcohol mixtures as fuels; ether production.

ALLOY STEELS

Chrome-Vanadium. The Mechanical Properties of Some Chrome-Vanadium Steels, J. S. Vanick. Am. Soc. for Steel Treating—Trans., vol. 3, no. 2, Nov. 1922, pp. 196–217, 27 figs. Investigation for pur-

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Note.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 122

Accumulators, Hydraulic
* Hydraulic Press Mfg. Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Mchy. Corp'n

Aerial Tramways
(See Tramways, Wire Rope)

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Alternators
(See Generators, Electric)

Ammeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Ammonia Condensers, Fittings, etc.
(See Condensers, Fittings, etc., Ammonia)

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.

Asbestos Products
* Johns-Manville (Inc.)

Ash Handling Systems (Steam Jet)
Green Engineering Co.

Babbit Metal
American Crucible Products Co.
* Medart Co

Baffle Walls, Boiler
Brinckerhoff, H. Gordon Co.
* King Refractories Co. (Inc.)

Balanced Draft Systems
Brinckerhoff, H. Gordon Co.

Balancing Machines
* Vibration Specialty Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Bronze
American Crucible Products Co.

Bearings, Roller
* Gwilliam Co.
* Norma Co. of America
* Royersford Fdy. & Mch. Co.
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Chain Link
(See Chain Belts and Links)

Belting, Conveyor
Goodrich, B. F. Rubber Co.

Belting, Elevator
Goodrich, B. F. Rubber Co.

Belting, Endless
Goodrich, B. F. Rubber Co.

Belting, Rubber
Goodrich, B. F. Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending Machines, Hydraulic
* Hydraulic Press Mfg. Co.

Bending & Straightening Machines
* Hydraulic Press Mfg. Co.
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller-Bearing Co.

Binder (Lenix)
* Smidth, F. L. & Co.

Bleaching Machinery
Philadelphia Drying Machinery Co.

Blocks, Tackle
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Blowers, Centrifugal
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Forge
Clarage Fan Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blowers, Steam (Ring Type)
* McClave Brooks Co.

Blowers, Turbine
Brinckerhoff, H. Gordon Co.
* Kerr Turbine Co.

Blueing
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Compounds
(See Compounds, Boiler)

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, Etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Murray Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Heine Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* Murray Iron Works Co.
* O'Brien, John Boiler Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Heine Boiler Co.
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
Heine Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Bolts, Stove (Steel)
* Reed & Prince Mfg. Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Vogt, Henry Machine Co.

Brewers' and Bottlers' Machinery
* Vilter Mfg. Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
Brinckerhoff, H. Gordon Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Whiting Corporation

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.
Whiting Corporation

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Burrs (Steel, Brass & Copper)
* Reed & Prince Mfg. Co.

Bushings, Bronze
American Crucible Products Co.
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equipment & Engrg. Co.

Cable Railways
(See Railways, Cable)

Cable Wire
(See Rope, Wire)

Cables, Electrical
(See Wire & Cables, Electrical)

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

pose of obtaining information which would have practical value in design and construction of apparatus in nitrogen-fixation equipment.

Forging. The Manufacture of Fine Forging Steels, Larry J. Barton. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1922, pp. 612-618, 9 figs. Electric-furnace practice; casting methods; raw materials used; heat logs for carbon, chromium and nickel-chromium steels.

Iron-Boron-Carbon. The Ternary System Iron-Boron-Carbon (Uber das ternare System Eisen-Bor-Kohlenstoff), R. Vogel and G. Tammann. Zeit. fur anorganische u. allgemeine Chemie, vol. 123, no. 4, Sept. 28, 1922, pp. 225-275, 52 figs. partly on supp. plates. Equilibrium diagrams of boron-carbon steels; crystallization; results of experiments with various alloys, their microstructure; influence of boron on hardening of steels.

Properties. Constructional Requirements and Properties of Steels (Konstruktionsanforderungen und Eisenschaften des Stahles). Elektrotechnik u. Maschinenbau, vol. 40, no. 48, Nov. 26, 1922, pp. 561-564. Discusses various alloy steels, their composition and properties under mechanical, physical or chemical stress, tensile-strength tests; etc.

Tool. Comparison of Hardness of Various Tool Steels When Hot (Essais comparatifs de durete à chaud sur divers aciers à outils), E. Schneider. Revue de Metallurgie, vol. 19, no. 11, Nov. 1922, pp. 676-680. Effect of heat treatment; relation between heat treatment and structure; hot hardness; cutting capacity.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Copper. See COPPER ALLOYS.

Iron. See IRON ALLOYS.

Lead. Binary Lead Alloys (Binare Bleilegierungen), J. Goebel. Zeit. fur Metallkunde, vol. 14, no. 10, Oct. 1922, pp. 388-394, 9 figs. Deals with lead-cadmium, lead-bismuth and lead-mercury alloys.

Light. Light Alloys. Their Recent Progress (Les alliages legers. Leurs recents progress). Leon Guillet. Revue de Metallurgie, vol. 19, no. 11, Nov. 1922, pp. 688-695. Binary and complex aluminum alloys; properties and composition of magnesium and its alloys.

Non-Ferrous, Contraction of. Contraction and Shrinkage of Nonferrous Alloys as Related to Casting Practice, Robert J. Anderson. U. S. Bur. of Mines Reports of Investigations, no. 2410, Nov. 1922, 13 pp. Technical aspects of contraction in relation to foundry practice.

X-Ray Examination of. X-rays as a Means of Determining the Composition of Alloys, T. S. Fuller. Gen. Elec. Rev., vol. 25, no. 12, Dec. 1922, pp. 746-750, 1 fig. Writer claims that by determining comparative X-ray absorption power of unknown alloy, by matching intensity of its X-ray image against intensities of certain carefully prepared standards of same thickness, and by correlating such data with that of knowledge common to metallurgists, it is possible to approximate closely composition of unknown.

ALUMINUM

Polishing. Polishing Aluminum and Its Alloys for Metallographic Study, E. H. Dix, Jr. Chem. & Met. Eng., vol. 27, no. 25, Dec. 20, 1922, pp. 1217-1220, 7 figs. Methods employed in metallurgical laboratory of Eng. Division of U. S. Army Air Service, McCook Field.

ALUMINUM ALLOYS

Aluminum-Zinc. The Constitution of Aluminum-Zinc Alloys (Zur Kenntnis der Konstitution der Aluminium-Zinklegierungen), W. Sander and K. L. Meissner. Zeit. fur Metallkunde, vol. 14, no. 10, Oct. 1922, pp. 385-387, 11 figs. Investigation of area of concentration from 65 to 100 per cent aluminum of the aluminum-zinc alloys in comparison to the diagrams of Bauer-Vogel and Hansen-Gayler; new partial diagram is plotted.

Castings. Aluminum Alloys for Casting. Brass World, vol. 18, no. 11, Nov. 1922, pp. 330-332. Aluminum-copper and aluminum-zinc-copper series; manganese, magnesium and nickel alloys. Tables giving densities, moduli of elasticity, tensile strengths, thermal conductivities, linear thermal expansitivities, shrinkage, melting points and specific heat.

Duralumin. See DURALUMIN.

AMMONIA COMPRESSORS

Losses. Losses in Ammonia Compressors, S. F. Smith. Refrigeration, vol. 31, no. 4, Nov. 1922, pp. 22-23. Discussion of the five ways in which losses occur in compression machines. From address before Mountain States Ice Mfrs. Assn. convention.

Selection. The Selection of an Ammonia Compressor, H. J. Macintire. Southern Engr., vol. 38, no. 4, Dec. 1922, pp. 38-39, 2 figs. Shows what size of compressor is required for certain tonnage of output of refrigeration.

Single-Acting. Performance of Single Acting Simple Ammonia Compressor, and Tubular Condensers, George A. Horne. Refrig. Eng., vol. 9, no. 5, Nov. 1922, pp. 143-151 and 161, 11 figs. Tests made in plant of Merchants' Refrig. Co., N. Y. C., on vertical, three-cylinder compressor of enclosed type with pistons 18 in. in diam. and 20-in. stroke.

Thermodynamics of. Thermodynamics of Ammonia Compression, W. H. Motz. Refrig. Eng., vol. 9, no. 4, Oct. 1922, pp. 119-124 and (discussion) 124-126 and 132-133, 8 figs. Writer calls attention to correct theoretical relation of pressures, temperatures, volumes, work, power and capacities of ammonia compressors.

AUTOGENOUS WELDING

Copper Locomotive Fireboxes. Repair Work in Copper Locomotive Fireboxes (Ausbesserungsarbeiten an kupfernen Lokomotiv-Feuerbüchsen), Wesse. Autogene Metallbearbeitung, vol. 15, no. 21, Nov. 1, 1922, pp. 229-306, 2 figs. Discusses replacing of iron fireboxes by copper ones at German railways and the various kinds of repairs necessary, including autogenous welding; quality of acetylene and oxygen used; cost data.

Efficiency. Notes on Autogenous Welding (Notes sur la soudure autogène), A. Zivy. Revue Industrielle, vol. 52, nos. 9, 10, 11, 12 and 13, July, Aug., Sept., Oct. and Nov. 1922, pp. 300-302, 331-334, 364-366, 415-417 and 458-459, 22 figs. Definition of a good weld; choice of gas and generator; blow pipes and their selection; filling metals and fluxes for autogenous joints; importance of choice of operators and inspection of their work.

AUTOMOBILE ENGINES

Armstrong-Siddeley Jaguar. New 14-Cylinder Air Cooled Radial Engine of British Design, M. W. Bourdon. Automotive Industries, vol. 47, no. 20, Nov. 16, 1922, pp. 975-977, 7 figs. Armstrong-Siddeley "Jaguar" passes test to comply with British Air Ministry "ideal specification" thought unattainable. Enclosed fan serves as mixture distributor and provides forced-induction effect.

Beau-de-Rochas. Recent Progress in Light Explosion Engines (Progrès recents du moteur leger à explosions). Metallurgie, vol. 54, no. 44, Nov. 2, 1922, pp. 1625-1626. Discusses 4-stroke automobile engines of Beau-de-Rochas type, using kerosene as fuel.

Carburetor. See CARBURETORS.

Combustion-Chamber Machining. Engine Design Aids Rapid Machining of Combustion Chamber, J. Edward Schipper. Automotive Industries, vol. 47, no. 21, Nov. 23, 1922, pp. 1019-1020, 2 figs. Packard single-six as typical example. Symmetry of cylinders and valves permits profiling to be done in one operation on six-spindle machine; cylinder head machined in 4 ½ min.

Exhaust-Gas Analysis. The Sampling and Analysis of Automobile Exhaust Gas, A. C. Fieldner and G. W. Jones. Franklin Inst.—Jl., vol. 194, no. 5, Nov. 1922, pp. 613-644, 7 figs. Method of sampling and analyzing exhaust gases developed and used by Bur. of Mines in connection with investigations pertaining to ventilation of vehicular tunnels and fuel economy in internal-combustion engines.

Ignition. See IGNITION.

Lycoming. Five Bearing Crankshaft Important Feature of New Lycoming Engine, Donald D. Blanchard. Automotive Industries, vol. 47, no. 20, Nov. 16, 1922, pp. 968-970, 4 figs. Smooth operation obtained by use of long connecting rods and light reciprocating parts. Special-type force-feed lubrication used; bore 3½, 3⅜, or 3¾ in. and stroke 5 in.

Moderate vs. High-Speed. Moderate vs. High Speed Passenger Car Engines. Automotive Industries, vol. 47, no. 22, Nov. 30, 1922, pp. 1079-1081. H. R. Ricardo and F. Strickland debate relative merits before Instn. Automobile Engrs.

Proprietary. Proprietary Power Units. Autocar, vol. 49, no. 1413, Nov. 17, 1922, pp. 1075-1079, 12 figs. Design of some "ready-made" engines.

Radiators. Suggested Terminology for Various Types of Radiator Cores, Herbert Chase. Automotive Industries, vol. 47, no. 20, Nov. 16, 1922, pp. 971-972. Three names proposed are fin and tube, ribbon cellular, and air-tube cellular, suggested definitions of which are given.

Single-Sleeve Valve. Single-Sleeve Valve Engine Adapted to Various Automotive Uses, M. W. Bourdon. Automotive Industries, vol. 47, no. 22, Nov. 30, 1922, pp. 1063-1066, 7 figs. Burt and McCollum design, formerly known as Argyll, attaining wider use in England; London Gen. Omnibus Co. has secured good results in preliminary tests; used for passenger-car, truck, tractor and portable applications.

Speed Regulation. Uniform Regulation of Engine Speed, Heinrich Dechamps. Automotive Industries, vol. 47, no. 24, Dec. 14, 1922, pp. 1174-1175, 5 figs. Points out that engine speed does not usually vary directly with displacement of throttle lever; connecting linkage of control lever and steering column can be so arranged as to make variation of speed more nearly proportional to lever movement.

AUTOMOBILE FUELS

Alcohol. The Question of a National Motor Fuel (La question du carburant national), C. Mariller. Technique Moderne, vol. 14, no. 12, Nov. 15, 1922, pp. 497-499. Pure alcohol, and mixed fuels; engines running on alcohol and alcoholized fuels.

Coal as Source of. Coal vs. Oil-Shale as Sources of Motor Fuel; High Heat, Fire-Burning Coke is Smoke Solution, Walter D. Bonner and Benjamin L. Johnson. Min. Rev., vol. 24, no. 15, Nov. 15, 1922, pp. 11-14. In author's opinion, low-temperature distillation of coal in Utah, considered as source of motor spirit as well as source of smokeless domestic fuel, presents extremely interesting possibilities.

Production and Sources. Treatment of Mineral Fuels for the Production of Automobile Fuel (Le traitement des combustibles minéraux envisagé au point de vue de la production de carburants), Ch. Berthelot. Société des Ingénieurs Civils de France—Mémoirs et Compte Rendu des Travaux, vol. 75, no. 7-9, July-Sept. 1922, pp. 345-359. Discusses French motor fuels, including extracts of Pechelbronn oil, benzol, alcohol; production of motor fuels; carbonization of coal and lignite; transforming heavy oil into motor fuel; hydrogenation.

Refining Process. Refining of Gasoline and Kerosene by Hypochlorites, A. E. Dunstan and B. T. Brooks. Jl. Indus. & Eng. Chem., vol. 14, no. 12, Dec. 1922 pp. 1112-1115. Deals with removal of sulphur from motor fuel by hypochlorite process, and points out advantages of process.

Tests. What Warm Weather Tests of Fuels Indicate. Automotive Industries, vol. 47, no. 24, Dec. 14, 1922, pp. 1168-1171, 5 figs. Practically same miles per gallon consumed but greater dilution of lubricant shown by less volatile fuels. Results of tests made by Bur. of Standards.

[See also ALCOHOL; GASOLINE.]

AUTOMOBILES

Air Resistance. Automobile Air Resistance Measured in Wind Tunnel. Automotive Industries, vol. 47, no. 23, Dec. 7, 1922, p. 1137, 1 fig. Tests made at Zeppelin Works show that air resistance of modern types of automobiles is materially less than would be concluded from coefficients found in engineering text books; advantages to be derived from complete streamlining of cars.

Calculation of Energy Output of Automobiles with Special Regard to Air Resistance (Die Leistungsberechung de Motorwagens unter besonderer Berucksichtigung des Luftwiderstandes), P. Jaray. Motorwagen, vol. 25, no. 29, Oct. 20, 1922, pp. 551-559, 12 figs. Results of measurements of air resistance of automobiles with different types of body, made in large wind tunnel of Zeppelin Works at Friedrichshafen. Air resistance was found to be considerably less than has been generally assumed heretofore. Advantages of streamline form.

Bodies. All-Weather Touring Body of British Design for Delage Chassis. Automotive Manufacturer, vol. 65, no. 8, Nov. 1922, pp. 15-17, 2 figs. Details of body designed for all-year touring in England, for use on French Delage 24-hp. chassis.

Design. Progress in Design. Autocar, vol. 49, no. 1412, Nov. 10, 1922, pp. 947-954, 12 figs. General survey of mechanical features of automobiles for 1923.

Electric Equipment Standardization. An Executive View of Automotive Electric Standardization, G. B. Griffin. Automotive Industries, vol. 47, no. 22, Nov. 30, 1922, pp. 1072-1073. It is claimed that business men of automotive industry have not given adequate support to creation and use of standards; needless variations in detail result in higher costs and many service complications; cradle or foot-mounted generator with separate stub shaft favored.

Electric, Hawa. The New Hawa Car (Der neue Hawa-Wagen), Werner Steffen. Motor u. Auto, vol. 19, no. 18-19, Oct. 15, 1922, pp. 241-244, 3 figs. New type of electric automobile equipped with storage battery of 40 volts.

German Moll. Moll Car, German Product, Designed for Quantity Production, Benno R. Dierfeld. Automotive Industries, vol. 47, no. 20, Nov. 16, 1922, pp. 973-974, 4 figs. Four-cylinder engine, 2.75 bore and 3.94 stroke, turning radius of 14¼ ft., 118-in. wheelbase, ground clearance of 9 in. and weight of 2200 lb. 30,000 to be built in 5 years.

Headlights. Motor-Vehicle Head-Lamps and Road-Lighting, R. C. Gowdy and J. G. Balsillie. Soc. Automotive Engrs.—Jl., vol. 11, no. 6, Dec. 1922, pp. 557-560, 3 figs. Authors state that direct solution of problem lies in modifying reflector so that light is distributed properly at its first reflection and lenses or secondary devices are rendered unnecessary. Description of light-distribution experiments; types of reflector and amount of light-distribution desirable.

Jewett Sedan. Manufacture of Jewett Sedan Shows Progress in Pressed Metal Work, J. Edward Schipper. Automotive Industries, vol. 47, no. 24, Dec. 14, 1922, pp. 1180-1183, 11 figs. Pressed shapes, formerly made in two or three parts, now made in one piece; body made in three plants presents special problems.

London Show. Coachwork at the Show. Autocar, vol. 49, no. 1412, Nov. 10, 1922, pp. 1024-1036, 54 figs. Alphabetically arranged review of coachwork exhibits at White City and Olympia.

Show Review, Olympia and White City, November 3-11, 1922. Automobile Engr., vol. 12, no. 170, Nov. 23, 1922, pp. 354-384, 116 figs. Detailed consideration of engines; electrical equipment; engine and gear-box mounting; clutches; gear boxes; rear and front axles; springs and suspension.

The Automobile Show at Olympia and the White City. Autocar, vol. 49, no. 1412, Nov. 10, 1922, pp. 959-1019, 264 figs. Description of 1923 car designs arranged in alphabetical order, with detailed specifications, country of origin and prices.

Motorcycle and Sidecar vs. Light. The Light Car and the Motor Cycle and Sidecar Compared, W. Halcot Hingston. Automobile Engr., vol. 12, no. 169, Nov. 1922, pp. 346-351, 4 figs. Comparison of first cost, running and up-keep cost, seating and luggage capacity, comfort, reliability, appearance, speed and hill-climbing ability; author suggests design which he is confident would supply long-felt want.

Power-Weight Ratio. Power-Weight Ratio of 1923 Cars, Douglas Leechman. Autocar, vol. 49, no. 1413, Nov. 17, 1922, pp. 1082-1084. Need for further close and sympathetic consideration of subject. Table giving cylinder dimensions, and weight per cu. cm. of number of 1923 cars.

Small Six-Cylinder. Small Six-Cylinder Cars. Autocar, vol. 49, no. 1414, Nov. 24, 1922, pp. 1113-1118, 14 figs. Advantages; induction-pipe design; technical details; typical examples. Specifications of 16 six-cylinder cars under 3 liters capacity.

Standardization of Parts. Reports of Divisions to Standards Committee. Soc. Automotive Engrs.—Jl., vol. 11, no. 6, Dec. 1922, pp. 529-547, 12 figs. 16 Division reports of automotive and parts and materials Divisions.

Suspension. A New Suspension System. Automobile Engr., vol. 12, no. 169, Nov. 1922, pp. 343-345,

* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Car Hauls, Cable and Chain
Link-Belt Co.

Cars, Charging
Whiting Corporation

Cars, Freight Elevator
Eastern Machinery Co.

Cars, Industrial Railway
Link-Belt Co.
Whiting Corporation

Cars, Trolley (Industrial Railway)
Link-Belt Co.
Whiting Corporation

Casehardening
* American Metal Treatment Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* United States Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co.

Castings, Brass
DuPont Engineering Co.
Weatherly Foundry & Mfg. Co.

Castings, Brass & Bronze
* Lunkenheimer Co.

Castings, Bronze
American Crucible Products Co.

Castings, Die-Moulded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Gray Iron
DuPont Engineering Co.
Weatherly Foundry & Mfg. Co.

Castings, Heavy
* United States Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
* Cole, R. D. Mfg. Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Lunkenheimer Co.
* McClave Brooks Co.
* Roversford Fdry. & Mch. Co.
* United States Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Lunkenheimer Co.
* Vogt, Henry Machine Co.

Castings, Steel
Mackintosh-Hemphill Co.

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugal Blowers, Pumps
(See Blowers, Pumps, etc., Centrifugal)

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chain Grate Stokers
(See Stokers, Chain Grate)

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corporation

Charging Machines
Whiting Corporation.

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Steel
(See Stacks, Steel)

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Magnetic
* Heald Machine Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Hendrick Mfg. Co.

Chutes, Gravity
Link-Belt Co.

Cinder Mills
(See Mills, Cinder)

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Clamps, Wire Rope
(See Wire Rope Fastenings)

Cloth, Rubber
Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Eastern Machinery Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Electric Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Link-Belt Co.
* Medart Co.
* Roversford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compounds, Boiler
Unisol Mfg. Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Concrete Hardener
Sonneborn, L. Sons (Inc.)

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* United States Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.

Controllers, Filter Rate
* Builders Iron Foundry

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.

Converters, Steel
Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
* Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.

Conveyors, Gravity (Roller)
Link-Belt Co.

Conveyors, Ice
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
* Gifford-Wood Co.
Link-Belt Co.

Coolers, Brine
* Frick Co. (Inc.)

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Corliss Engines
(See Engines, Steam, Corliss)

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Couplings, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Fawcus Machine Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
* Medart Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Roversford Foundry & Machine Co.

6 figs. Describes Gatti system, employing horizontal coil springs; no fixing between axle and suspension mechanism.

AVIATION

Aerial Lighthouses. Beacons and Wind Indicators for Night Flying. Aviation, vol. 13, no. 21, Nov. 20, 1922, pp. 688–689, 3 figs. Some details of beacon in operation at Hampton Roads under supervision of Navy Bur. of Aeronautics, and ground wind indicator which is being installed by Army Air Service at Dayton, Ohio.

Safety. Coefficient of Safety and the Future of Aviation (Les Coefficients de Sécurité et l'Avenir de l'Aviation.) Louis Bleriot. Aérophile, vol. 30, no. 19-20, Oct. 1–15, 1922, pp. 305–306. Discusses coefficient of safety from standpoint of increasing speed and increasing differences in altitude.

Soaring Flight. Soaring Flight (Le vol à voile), Henri Lurette. Nature, no. 2533, Oct. 21, 1922, pp. 259–263, 9 figs. Construction of wings of birds and their action in flight.

Speed of Flight. Greatest Attainable Speeds in Aviation—Use of the Turbo-Compressor (Les plus grandes vitesses possibles en aviation—Emploi du turbo-compresseur), A. Rateau. Revue Universelle des Mines, vol. 15, no. 4, Nov. 15, 1922, pp. 253–283, 9 figs. Shows that 400 km. per hour is possible at high altitude with engine under supercompression; normal atmosphere; design and operation of Rateau turbo-compressor.

B

BALANCING

High-Speed. High-speed Balancing. Eng. Production, vol. 5, no. 111, Nov. 16, 1922, p. 468, 2 figs. Efficient methods.

BEARINGS

Babbitted. How to Make Babbitted Bearings That Will Last Long and Run Cool and Smoothly, Gustav H. Radebaugh. Coal Age, vol. 22, no. 21, Nov. 23, 1922, pp. 829–832, 15 figs. Metal should be poured from ladle with round spout and all dampness should be avoided; how to gage correct temperature; casting base and cap in one operation; providing oil holes and grooves.

Overcoming Difficulties in Babbitt Bearings, W. S. Standiford. Can. Machy., vol. 28, nos. 16 and 17, Oct. 19 and 26, 1922, pp. 26–27, and 20 and 23. Oct. 19. Discusses difficulties, including coarse granular structure, uneven wear, shrinkage of shells, split bearings, bronze linings, etc., and remedies. Oct. 26. Selection of babbitt and maintenance of bearings.

Design and Lubrication. Bearings and Bearing Metals, Christopher H. Bierbaum. Machy. (N. Y.), vol. 29, no. 4, Dec. 1922, pp. 298–300, 3 figs. Summary of practical conclusions drawn from author's experience. Analysis of action of journal in bearing; hardening and grinding of journals. Chapter of handbook to be published by Lunem Bearing Co.

BEARINGS, BALL

Roller and. Ball and Roller Bearings in Metallurgy (Du Emploi des roulements à billes et à rouleaux dans l'industrie metallurgique), R. Lauret. Outillage, vol. 6, no. 48, Dec. 2, 1922, pp. 1609–1611, 8 figs. Comparison of journal, ball and roller bearings, and advantages of latter; coefficients of friction; various applications of ball bearings in machine tools.

BEARINGS, ROLLER

Mill Motors, Application to. Roller Bearings Applied to Mill Motors, L. J. Hess. Assn. Iron & Steel Elec. Engrs., vol. 4, no. 11, Nov. 1922, pp. 739–746 and (discussion) 747–763, 7 figs. Author's experience with particular type of roller bearings.

BEARINGS, THRUST

Propeller. Friction Tests of Propeller Thrust Bearings, H. A. Stevens Howarth and Nelson Ogden. Am. Soc. Nav. Engrs.—Jl., vol. 34, no. 4, Nov. 1922, pp. 564–578, 11 figs. Kingsbury and horseshoe types compared.

BELT DRIVE

Calculations. Belt Drive (Essai d'une théorie du fonctionnement des courroies), M. Auclair. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 75, no. 7–9, July-Sept. 1922, pp. 496–523, 23 figs. Discusses Rankine and other formulas, coefficient of friction, elasticity of belt, and makes calculations.

Transmission by Belting (Expériences sur le fonctionnement des transmissions par courroies), Boyer-Guillon. Société des Ingénieurs Civils de France—Mémoirs et Compte Rendu des Trauaux, vol. 75, no. 7–9, July-Sept. 1922, pp. 482–495, 12 figs. partly on supp. plate. Results of tests carried out at laboratory of Conservatoire National des Arts et Métiers covering velocity, friction, determination of coefficient and efficiency.

BLAST FURNACES

Claire. New Claire Furnace, George F. Tegan. Iron Age, vol. 110, no. 22, Nov. 30, 1922, pp. 1422–1423, 3 figs. Example of modern standard blast-furnace practice, with unusual methods of disposing of slag.

Flue-Dust Briquetting. Flue Dust Briquetting by Corrosion Process, A. L. Stillman. Iron Age, vol. 110, no. 24, Dec. 14, 1922, pp. 1571–1572, 2 figs. Plant of H. A. Hanna Furnace Co., Buffalo, N. Y., has adopted corrosion process of briquetting for flue-dust reclamation.

Ford River Rouge Plant. Ford Principles and Practice at River Rouge, John H. Van Deventer. Indus. Management (N. Y.), vol. 64, no. 6, Dec. 1922, pp. 321–328, 9 figs. How blast-furnace unit fits into Ford industrial chain.

Magnetic Ore in. Use of Magnetic Ore in the Blast Furnace, G. P. Pilling. Am. Inst. Min. & Met. Engrs.—Trans., no. 1199-S, Dec. 1922, 13 pp.; also (abstract) in Min. & Metallurgy, no. 192, Dec. 1922, pp. 32–33. Comment as to design and difficulties encountered, with particular reference to ores of Eastern Pennsylvania and Adirondack region.

BLOWERS

Scavenging Turbo. Rotary Scavenging Blowers for Two-Stroke Marine Diesel Engines. Engineering, vol. 114, no. 2970, Dec. 1, 1922, pp. 676–678, 8 figs. Details of turbo-blower sets made by Brown, Boveri & Cie., Baden, Switzerland, advantages.

BOILER FEEDWATER

Treatment. Boiler Feed Water—As it Ought to Be—Zero Soft, Ernest Rowe. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1922, pp. 647–648, 2 figs. Permutit zeolite water-softening system, installed as auxiliary to feedwater system at plant of Curtice & Co., Bergen, N. Y., is said to have overcome all troubles due to boiler water.

Extensive Water Treating Facilities Established on the St. Paul, C. Herschel Koyl. Ry. Maintenance Engr., vol. 18, no. 10, Oct. 1922, pp. 344–346, 6 figs. Two types of construction feature 14 installations recently completed, one for main-line and one for branch-line plants.

Getting Rid of Boiler Scale, Ernest M. Rowe. Brick & Clay Rec., vol. 61, no. 11, Nov. 28, 1922, pp. 797–798, 2 figs. Describes Permutit system of water softening; saves 6 to 30 per cent in fuel.

The Chemical Treatment of Feed Water. Power, vol. 56, no. 25, Dec. 19, 1922, pp. 984–986, 2 figs. Explains meaning of hardness and shows how it may be eliminated by "lime-and-soda" treatment.

Use of Illinois Waters in Wabash Locomotive Boilers, O. W. Carrick. Am. Water Works Assn.—Jl., vol. 9, no. 6, Nov. 1922, pp. 906–912 and (discussion) 912–916. Account of gratifying results obtained on Wabash Railway by systematic treatment of waters containing sulphate of lime and magnesia with slight amount of soda ash.

BOILER FIRING

See PULVERIZED COAL; Boiler Firing.

BOILER OPERATION

Efficiency. Practical Operation of Steam Generation (La pratique de la conduite des generateurs de vapeur), Henri Itier. Revue Industrielle, vol. 52, no. 13, Nov. 1922, pp. 454–457. Choice of fuel; combustion; natural and forced draft; heat transmission; feedwater; etc.

BOILER PLANTS

Economy. Problems of Heat Economy in Germany (Probleme der Wärmewirtschaft in Deutschland), W. Quack. Zeit. fur angewandte Chemie, vol. 35, no. 87, Oct. 31, 1922, pp. 621–625, 10 figs. Heat consumption in various types and sizes of plants; losses in fuel and unconsumed gases; waste-heat utilization; steam accumulators.

Heat Balance. Keeping Account of Calories in Steam Plants (La comptabilite des calories dans les usines à vapeur), Victor Kammerer. Societe Industrielle de Mulhouse—Bul., vol. 88, no. 8, Oct. 1922, pp. 549–566. Also Associations Françaises de Propriétaires d'Appareils à Vapeur—Bul., vol. 3, no. 10, Oct. 1922, pp. 169–184. Choice of fuel; control of fuel and of combustion; measures and gages used; bonuses.

Lignite-Burning. Power Plant of the Provincial Hospital, Weyburn, Sask., Canada. Power, vol. 56, no. 25, Dec. 19, 1922, pp. 966–968, 3 figs. Plant about 30 mi. from lignite coal fields burns this fuel on chain-grate stokers under water-tube boiler; main units, vertical high-speed engines with direct-connected generator and exciter.

BOILER TUBES

Slag Formation. An Investigation and Discussion of Slag Formation on Boiler Tubes, Harry H. Bates. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1922, pp. 642–646, 7 figs. Conclusions arrived at after extensive tests; boiler operation and methods of preventing slag formation on boiler tubes. See also Southern Engr., vol. 38, no. 4, Dec. 1922, pp. 53–57, 6 figs.

BOILERS

Code, A.S.M.E. Second Revision of A.S.M.E. Boiler Code, 1922. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 850–857, 5 figs. Revisions which have met approval of Boiler Code Committee.

Combustion in. Economic Combustion in Steam Boilers (Breves Datos acerca de la Combustión y de los Métodos Economicos de Combustión en las Calderas de Vapor), Rogelio Suarez Mena, Sociedad Cubana de Ingenieros—Revista, vol. 14, no. 3, July-Sept. 1922, pp. 199–211. Temperature; calorific value of fuels; specific heat; flue gases; heat balance; firing; waste-heat utilization.

Efficiency. Present and Future of Steam Boilers (Heden en toekomst van den stoomketel), E. C. von Pritzelwitz van der Horst. Ingenieur, vol. 37, no. 41, Oct. 14, 1922, pp. 817–821. Increased steam generation and its requirements; preheating of air and water; economizers; combustion.

Evaporation Tests. Evaporation Tests (Essais de vaporisation), Moulinier. Revue de Métallurgie, vol. 19, no. 10, Oct. 1922, pp. 609–613. Gives test data and analyses of various types of boilers; concludes that by pulverizing it is possible to use any fuel with low volatilization and high ash content in place of steam coal.

Feeding. Boiler Feeding (Algo sobre alimentacion de calderas), Garcia Mercadal. Energia Electrica, vol. 24, no. 4, Feb. 25, 1922, pp. 33–35, 1 fig. Discusses increased amount of evaporation due to modern developments; maintains feedwater level; variation of loads on boilers.

Heat-Balance Calculation. What Is a Heat Balance and How Is It Calculated? Power Plant Eng., vol. 26, no. 23, Dec. 1, 1922, pp. 1162–1165. J. R. Darnell points to inaccuracies of method of calculating described by A. W. Binns, whose reply gives authorities for formulas and constants.

Seams, Crushing Strength. Determining the Crushing Strength of Boiler Seams, Thomas H. Walker. Boiler Maker, vol. 22, no. 11, Nov. 1922, pp. 312–314, 3 figs. Results of tests indicate proportions for lap seams subjected to double shear loads.

BORING TOOLS

Diamond. Details of Diamond Boring Tools, G. T. Linting. Am. Mach., vol. 57, no. 25, Dec. 21, 1922, pp. 949–950, 2 figs. Recommended sizes of boring bar; angle for setting tools; methods of sharpening; kind of diamonds and how they are inserted in tools.

BRAKES

Freight-Train. Continuous Brakes for Freight Trains (Die Verwendung durchgehender Bremsen fur Güterzuge). Organ für die Fortschritte des Eisenbahnwesens, vol. 77, no. 17, Sept. 1, 1922, pp. 255–269. Westinghouse, Clayton-Hardy, Kunze-Knorr, and Lipkowsky systems, their operation and application in various countries.

C

CABLEWAYS

Construction. Cableways (Ueber die Bedeutung der Drahtseilbahnen), Krause. Glasers Annalen, vol. 91, no. 8, Oct. 15, 1922, pp. 121–125, 10 figs. Application for transportation of freight generally, loading of ships, ore handling, conveying passengers, conveying in workshops; examples in various countries.

Coal Mines. The Aerial Wire Ropeway at Trimdon Grange Colliery, R. S. Tate. Instn. Min. Engrs.—Trans., vol. 64, part 1, Oct. 1922, pp. 30–44 and (discussion) 44–46, 11 figs. Bi-cable ropeway, 1040 ft. long with carrying capacity of 40 tons per hr.

Types. Various Systems of Aerial Cableways (Sui diversi sistemi di Ferrovie aeree). Rivista Tecnica della Svizzera Italiana, vol. 11, no. 10, Oct. 1922, pp. 110–112. Compares three-cable and one-cable systems for aerial conveying, their operation, cost and upkeep.

CAMS

Uses. Methods of Machine Tool Design, A. L. De Leeuw. Am. Mach., vol. 57, no. 25, Dec. 21, 1922, pp. 963–967, 4 figs. Principal uses of cams; cams for holding and clamping devices, and as feed rate variators; contour milling.

CAR WHEELS

Chilled-Iron. A Call for Better Chilled Cast Iron Wheels, P. H. Griffin. Iron Age, vol. 110, no. 22, Nov. 30, 1922, pp. 1419–1420. Problem presented by failures in service is said to be not in difficulty of making wheels, but in existing replacement practice.

CARBURETORS

Annular-Float. The Schlee Annular-Float Carburetor (Der Schlee-Ringschwimmer-Vergaser), H. Wimplinger. Motor u. Auto, vol. 19, no. 17, Sept. 20, 1922, pp. 234–235, 4 figs. Details of new carburetor for all single- and multi-cylinder, one- and two-cycle engines constructed for both vertical and horizontal connection.

Orifices. Research on Small Drilled Orifices, W. S. von Bernuth. Automotive Manufacturer, vol. 64, no. 8, Nov. 1922, pp. 7–8, 4 figs. With special reference to extremely small holes needed in carburetors and vaporizing devices—being part of work conducted by Purdue Eng. Experiment Station; special apparatus designed for testing.

CARS, COAL

Distribution of Empty. New Rules Proposed for Distribution of Empty Coal Cars. Ry. Rev., vol. 71, no. 21, Nov. 18, 1922, pp. 697–700, 4 figs. Plan to increase coal car supply by encouraging more efficient handling of empty cars placed before Interstate Commerce Commission. Outline of proposed rules and arguments advanced in their favor.

CARS, FREIGHT

Automobile. Design of Automobile Car Presents Special Problems. Ry. Rev., vol. 71, no. 22, Nov. 25, 1922, pp. 731–739, 10 figs. Detailed description of car designed by Chicago, Milwaukee & St. Paul, and fundamental calculations involved in design; emphasizes important distinctions in construction of various cars of same general type.

Container. Container Car Freight Service on the New York Central, F. S. Gallagher. Ry. & Locomotive Eng., vol. 35, no. 12, Dec. 1922, pp. 315–317, 2 figs. Description of operations and savings effected with new container system of handling less-than-carload freight. Abstract of paper read before Soc. Terminal Engrs.

CARS, PASSENGER

Sleepers. New Rolling-Stock for the International

Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Union
(See Unions)

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
Whiting Corporation.

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corporation

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corporation

Cranes, Locomotive
* Brown Hoisting Machinery Co.
Link-Belt Co.
Whiting Corporation

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works
Whiting Corporation

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Crank Shafts
Link-Belt Co.

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Roll
Eastern Machinery Co.
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cupolas
* Bigelow Co.
Northern Engineering Works
Whiting Corporation

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
Haynes Stellite Co.
* Whitney Mfg. Co.

Cylinders Rebored
* Hooven, Owens, Rentschler Co.

Damper Regulators
(See Regulators, Damper)

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Die Castings
(See Castings, Die Moulded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Blanking
* Bliss, E. W. Co.

Dies, Punching
* Bliss, E. W. Co.

Dies, Sheet Metal Working
* Bliss, E. W. Co.

Dies, Thread Cutting
Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Drafting Room Furniture
Dietzgen, Eugene Co
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Drawing Instruments
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Drawing Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Lidgerwood Mfg. Co.
* Morris Machine Works

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
* Johns-Manville (Inc.) Manufacturing Equipment & Engrg. Co.

Drop Forgings, Hammers, etc.
(See Forgings, Hammers, etc., Drop)

Dryers, Coal (Centrifugal)
Link-Belt Co.

Dryers, Rotary
* Bigelow Co.
Link-Belt Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Philadelphia Drying Machinery Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
Clarage Fan Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.

Dustproofing Materials
Sonneborn, L. Sons (Inc.)

Dyeing Machinery
Philadelphia Drying Machinery Co.

Dynamic Balancing Machines
(See Balancing Machines, Dynamic)

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Electric Generators, Hoists, Trucks Welding, etc.
(See Generators, Hoists, Trucks, Welding, etc., Electric)

Electric Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Electric Measuring Instruments
(See Instruments, Electrical Measuring)

Electric Supplies
* General Electric Co.
* Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Elevators, Electric
Eastern Machinery Co.
Northern Engineering Works

Elevators, Hydraulic
Whiting Corporation

Elevators, Inclined
Link-Belt Co.

Elevators, Passenger and Freight
Eastern Machinery Co.
Northern Engineering Works

Elevators, Pneumatic
Whiting Corporation

Elevators, Portable
Link-Belt Co.

Elevators, Telescopic
Link-Belt Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co
* Hooven, Owens, Rentschler Co.

Engine Stops
* Schutte & Koerting Co.

Engineers, Consulting
(See Professional Engineering Service Section)

Engines, Blowing
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Engines, Distillate
Western Machinery Co.

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Otto Engine Works
Sterling Engine Co.
Western Machinery Co.

Engines, Gasoline
* Climax Engineering Co.
Otto Engine Works
Sterling Engine Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
Clyde Iron Works Sales Co.
* Hooven, Owens, Rentschler Co.
* Lidgerwood Mfg. Co.
* Morris Machine Works
Western Machinery Co.

Engines, Kerosene
* Climax Engineering Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Climax Engineering Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
Sterling Engine Co.
* Ward, Chas. Engineering Wks.
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
Western Machinery Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Otto Engine Works
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Morris Machine Works
Sterling Engine Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* Brownell Co.
Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Ridgway Dynamo & Engine Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
* Leffel, James & Co.
* Troy Engine & Machine Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Vilter Mfg. Co.

Engines, Steam, High Speed
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Vilter Mfg. Co

Engines, Steam, Throttling
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
Harrisburg Foundry & Machine Works
* Ridgway Dynamo & Engine Co.
Stumpf Una-Flow Engine Co. (Inc.)

Engines, Steam, Variable Speed
* Brownell Co.

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
Clarage Fan Co.

Exhausters, Gas
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Expansion Joints
(See Joints, Expansion)

Extractors, Centrifugal
Tolhurst Machine Works

Extractors Oil and Grease
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Machinery Co.

Fans, Exhaust, Mine
Clarage Fan Co.

Feed Water Circulators, Heaters, Heaters and Purifiers, etc.
(See Circulators, Heaters, Heaters and Purifiers, etc., Feed Water)

Feed Water Controllers
(See Regulators, Feed Water)

Sleeping Car Company. Ry. Engr., vol. 43, no. 515, Dec. 1922, pp. 445–453, 28 figs. All-steel sleeping cars built at works of Leeds Forge Co., Ltd., embodying latest ideas in passenger rolling stock. See also Ry. Age, vol. 73, no. 25, Dec. 16, 1922, pp. 1136–1139, 5 figs.

Second and Third-Class Sleeping Cars on French Railways. Ry. Gaz., vol. 37, no. 20, Nov. 17, 1922, pp. 613–615, 12 figs. Experimental cars being run between Paris and Brest.

CARS, REFRIGERATOR

Mechanically Cooled. Mechanically Cooled Railway Cars (Maschinell gekuhlte Eisenbahnwagen), M. Hirsch. Zeit. fur die gesamte Kalte-Industrie, vol. 29, no. 10, Oct. 1922, pp. 183–189, 5 figs. Describes a few typical examples and discusses desiderata for design of such cars.

CAST IRON

Growth and Deterioration. Growth and Deterioration of Grey Cast Irons under Repeated Heatings, Thos. E. Hull. Foundry Trade Jl., vol. 26, no. 326, Nov. 16, 1922, pp. 412–414. Constitutional, chemical and physical properties of normal gray cast iron; effect of phosphorus; Outerbridge's experiments; Moissan's conclusions; influences of gases on growth.

CENTRAL STATIONS

European. European Central Power Stations, C. W. E. Clarke. Power House, vol. 15, no. 21, Nov. 5, 1922, pp. 25–26. London and other British stations; French stations. Reprinted from The News.

Russia. Russia's First Regional Power Station, Charles P. Steinmetz. Elec. World, vol. 80, no. 22, Nov. 25, 1922, pp. 1155–1158, 2 figs. Transmission line 50 mi. long and operating at 110,000 volts completed between Kashira and Moscow, supplying Moscow with energy generated from low-grade coal.

Steam-Engineering Problems. Steam Engineering Practice in Modern Central Stations, T. E. Keating. Elec. Jl., vol. 19, no. 12, Dec. 1922, pp. 490–496. Thermal and operating problems at present under consideration by central-station engineers, and their influence on economic generation of power in modern steam stations.

Superpower. Superpower Study in Pittsburgh District, William W. Handy. Elec. World, vol. 80, no. 24, Dec. 9, 1922, pp. 1263–1267, 1 fig. Selection of type and location of generating stations; economics of bulk power production and distribution; comparative data and solutions of problems encountered in course of investigation.

CENTRIFUGALS

Steam-Turbine Driven. Steam Turbine Driven Centrifugals. Int. Sugar Jl., vol. 24, no. 287, Nov. 1922, pp. 596–598, 3 figs. Terry vertical turbine attached to Cresson-Morris centrifugal handles final speeds of 720 to 1150 r.p.m.

CHROME-NICKEL STEEL

Airplane Shafts. Manufacture of Alloy Steel for Airplane Shafts, E. Kothny. Chem. & Met. Eng., vol. 27, no. 21, Nov. 22, 1922, pp. 1020–1024. Experiments on manufacture of nickel-chromium steel in basic Heroult furnace; to produce airplane shafting with no trace of transverse structure, it is necessary to use very good raw material and refine with two oxidizing slags as well as with carbide slag. Translated from Stahl u. Eisen, Jan. 8 and May 20, 1920.

CHUCKS

Multi-Spindle. New Multi Spindle Chucking Machine for Automatic Production, P. M. Heldt. Automotive Industries, vol. 47, no. 22, Nov. 30, 1922, pp. 1074–1076, 4 figs. Six-spindle model designed by Baird Machine Co., adapted to pieces up to 6 in. in diam. and 6 in. in length; equipped with 8 tool slides.

COAL

Recovery from Ashes. Recovery of Unburned Fuel From Ashes (La recuperation des imbrales dans les cendres des foyers industriels). Chaleur et Industrie, vol. 3, no. 31, Nov. 1922, pp. 1774–1776, 2 figs. Describes ash separators for coal recovery and its cost.

COAL HANDLING

Conveyors. Modern Short-Distance Conveyors for Bulk Goods, Especially Coal (Neuere Nahfordermittel fur Schuttgut, insbesondere Kohle), G. W. Kochler. Zeit. des Bayerischen Revisions-Vereins, vol. 26, no. 21, Nov. 15, 1922, pp. 167–169, 6 figs. Automatic grabs and grab cranes; loading platforms; electric rapid conveyors; tipping devices; the Heinzelmann discharger; bucket conveyors; motor trucks; belt conveyors.

Plants. Coal Handling Plants (Transportinrichtingen voor kolenslik), F. K. Th. van Iterson. Ingenieur, vol. 37, no. 45, Nov. 11, 1922, pp. 903–907, 8 figs. Coal conveying and handling at mines and boiler houses; describes number of installations; advantages of mechanical over manual handling.

Handling Plant of the Super Power Station at Golpa, George F. Zimmer. Indus. Management (Lond.), vol. 8, no. 9, Nov. 16, 1922, pp. 291–296, 14 figs. Account of handling plant for lignite from natural deposit to boilers.

New Coal-Unloading Plants (Neue Kohlenumschlaganlagen), Hubert Hermanns. Archiv fur Warmewirtschaft, vol. 3, no. 11, Nov. 1922, pp. 214–216, 4 figs. Examples of plants with elevator and delivery spirals according to design of Heinzelmann & Sparmberg.

COKE

Formation in Oven. The Formation of Coke in the Oven from a Mixture of Coal and Pitch. Gas World, vol. 77, no. 1998, Nov. 4, 1922, pp. 10–13, 1 fig. Testing coking coals; actions in oven during carbonization; use of pitch with non-coking coals; precautions to be observed.

COKE-OVEN GAS

Open-Hearth Furnaces. Coke-Oven Gas for Open-Hearth Furnaces. Iron & Coal Trades Rev., vol. 105, no. 2856, Nov. 24, 1922, p. 775. Results of laboratory experiments at Usines Saint Jacques. Review of paper by Jean Dupuis before Congress at Liege.

Coke Oven Gas in Oper-Hearth Furnaces, Jean Dupuis. Iron Age, vol. 110, no. 24, Dec. 14, 1922, pp. 1561–1562. French discussion of various methods of using gas; effect of heating; use of mixed gases. Translated from Revue de Metallurgie, Oct. 1922.

COKE OVENS

By-Product. Modern By-Product Coking, Joseph Becker. Gas Age-Rec., vol. 50, no. 20, Nov. 11, 1922, pp. 653–656 and 671–675, 18 figs. European practice; reasons for superior American results; new ovens tried out by Koppers Co. at plant of Chicago By-Product Co. Paper read before Eastern States Blast Furnace & Coke Oven Assn. See also Coal Industry, vol. 8, no. 11, Nov. 1922, pp. 489–494, 12 figs.

Pushing Series. By-Product Coke Oven Operation "10" Pushing Series, A. Coe. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1922, pp. 619–622, 5 figs. Uniformity of products depends upon correct series. Consideration of "10" pushing series; diagrammatical demonstration.

COLD STORAGE

Plants. Bucyrus Ice and Cold-Storage Plant. Southern Engr., vol. 38, no. 4, Dec. 1922, pp. 35–37, 6 figs. By installation of a 150-hp. Diesel engine and a 220-volt, three-phase, 60-cycle direct-connected generator, in plant at Bucyrus, Ohio, operating cost was reduced from average of $42 per day to $17.15; saving over purchased power.

COMBUSTION

Control. Combustion Control (Le contrôle de la combustion), G. Deladriere. Revue Universelle des Mines, vol. 15, no. 5, Dec. 1, 1922, pp. 381–389. Relation between constituents of fuels and of flue gases; determination of excess air for combustion; volume of air used in combustion; volume of flue gases produced.

COMPRESSED AIR

Applications. Some Modern Applications of Compressed Air, F. A. McLean. Can. Engr., vol. 43, no. 20, Nov. 14, 1922, pp. 539–541, 5 figs. Relative merits of pneumatic versus hand calking and tamming, pneumatic hoists and use of air tools in connection with installation of service pipes.

CONDENSERS, STEAM

Lovekin and Navy-Type. Test of Main Condensers of Battleships Tennessee and Maryland, Joseph B. Lincoln and O. A. Van Denburgh, Jr. Am. Soc. Nav. Engrs.—Jl., vol. 34, no. 4, Nov. 1922, pp. 579–591, 6 figs. Results of tests of Lovekin and Navy-type condensers shows that cooling surface of former is from 15 to 35 per cent more efficient; air-cooling arrangements are equally effective.

Surface. Surface Condensers, Charles L. Hubbard. Southern Engr., vol. 38, no. 4, Dec. 1922, pp. 44–48, 13 figs. Advantages for certain kinds of work; types of condensers; computing tube or cooling surface.

CONNECTING RODS

Forged Aluminum vs. Steel. Forged Aluminum vs. Steel for Connecting Rods, Laurence H. Pomeroy. Automotive Industries, vol. 47, no. 20, Nov. 16, 1922, pp. 978–980. Author claims reduction in weight, obtained by use of aluminum, results in reduced inertia and reduced bearing pressures; smaller bearings can be used or engines can be run at higher speeds.

Locomotive, Guide Rods. New System of Guide Rods for Electric Locomotives (Un nuovo sistema di bielle articolate per locomotive elettriche), Giuseppe Bianchi. Elettrotecnica, vol. 9, no. 33, Nov. 25, 1922, pp. 762–764, 8 figs. Describes system of rods of the three-phase locomotive E 330 of state railways, and its advantages compared with other systems.

Machining. Making Wills Sainte Claire Connecting-rods, Fred R. Daniels. Machy. (N. Y.), vol. 29, nos. 3 and 4, Nov. and Dec. 1922, pp. 196–200, and 293–297, 20 figs. Methods employed in plant of Taft-Pierce Mfg. Co., Woonsocket, R. I., for machining high-grade automobile connecting rods.

CONVERTERS

Operation. Converter Produces Better Steel, Ralph Burke. Iron Trade Rev., vol. 71, no. 23, Dec. 7, 1922, pp. 1555–1556 and 1563. Attention to melting and blowing adds to quality of metal; cupola operations different from those in gray-iron melting; ferromanganese and ferrosilicon principal deoxidizers; aluminum not essential.

CONVEYORS

Workshop. Methods of Conveying in the Workshop. Machy. (Lond.), vol. 21, nos. 525, 526 and 527, Oct. 19, 26 and Nov. 2, 1922, pp. 67–72, 97–102 and 129–134, 21 figs. Oct. 19: Handling work between machining operations; gravity roiler conveyors; progressive or truck jigs; conveyors for moving materials vertically; conveyor belts and platforms. Oct. 26: Conveyors and auxiliary equipment used in number of up-to-date factories. Nov. 2: Automatic washing machine; power-driven conveyors for engine assembly; hand-operated conveyors for gearbox and rear-axle assembly; traveling platform for chassis assembly.

COPPER

Castings. Copper Castings for Electrical Purposes, Francis W. Rowe. Metal Industry (Lond.), vol. 21, no. 19, Nov. 10, 1922, pp. 433–434, 5 figs. Conductivity of copper and effect of impurities on its conductivity; results of silicon copper.

COPPER ALLOYS

Copper-Manganese. The Thermoelectromotive Force of Copper-Manganese Alloys, Skezug Kimura and Zunehachi Isawa. Physical Rev., vol. 20, no. 5, Nov. 1922, pp. 441–451, 8 figs. Preparation of alloys from electrolytic copper and thermite manganese; thermoelectromotive force per unit difference in temperature; effect of nickel, iron and aluminum on thermioelectromotive forces; relation of results to electron theory.

CORROSION

Pipes and Cables. Rules Concerning Protective Measures for Diminishing Corrosion of Pipes and Cables Due to Ground Currents of Electric Railways (Leitsätze betreffend Schutzmassnahmen zur Verminderung der Korrosion an Rohren und Kabeln durch Erdströme elektrischer Bahnen). Schweiz. Elektrotechnischer Verein Bul., vol. 13, no. 11, Nov. 1922, pp. 485–489. Decision of joint commission of Swiss Assn. of Gas & Hydraulic Engrs., Assn. Swiss Secondary Railways, and Swiss Assn. Elec. Engrs. See also Examples of Application of Rules, by H. F. Zangger, pp. 490–503, 8 figs.

Prevention. Corrosion—Apparatus to Prevent It. Power, vol. 56, no. 17, Oct. 24, 1922, pp. 645–648, 6 figs. Types of apparatus for preventing corrosion used in United States. In every case object is accomplished by removing dissolved oxygen either with or without other gases.

CRANES

Breakdown. 40-Ton Breakdown Crane for Jamaica Engineer, vol. 134, no. 3494, Dec. 8, 1922, p. 616, 2 figs. Special features of crane built by Cowans, Sheldon & Co., Ltd., Carlisle.

Types. 50 years of Crane Construction in the Ruhr District (50 Jahre Ingenieurarbeit des Ruhrbezirks im Hafenkraubau der Welt). Kessner and Krahnen. Fordertechnik u. Frachtverkehr, vol. 15, no. 23, Nov. 10, 1922, pp. 295–299, 21 figs. Detailed description of various types of steam and electric cranes, especially for harbor use, including floating cranes up to 250 tons lifting capacity.

CRANKSHAFTS

Power-Press. Designing Power Press Crankshafts, P. A. Friedell. Machy. (N. Y.), vol. 29, no. 4, Dec. 1922, pp. 284–286, 4 figs. Method for calculating strength of crankshafts and eccentric shafts used by writer and found to be very reliable.

CYLINDERS

Machining and Lapping Holes. Machining and Lapping Very Deep Holes, John B. Rose. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 807–812, 17 figs. Shop operations in forming of very accurate and highly finished cylindrical holes; drilling, boring, reaming and lapping operations, with especial emphasis on lapping. (Abridged.)

D

DIESEL ENGINES

Central-Station. Marine Diesel Engine Builder Enters Stationary Power-Plant Field. Power, vol. 56, no. 22, Nov. 28, 1922, pp. 838–839, 4 figs. Builds 600-hp. stationary Diesel, equipped with special governing device, extended shaft and outboard bearing to meet requirements of industrial or electric power plants.

Compressorless. The Compressorless Diesel Engine (Die kompressorlose Dieselmaschine), Constantin Redzich. Wirtschaftsmotor, no. 3, Mar. 25, 1922, pp. 15–17, 6 figs. Discusses various attempts to do without a compressor for fuel injection.

Development. Twenty-Five Years of Diesel Engine Construction (25 Jahre Dieselmotorenbau). Wirtschaftsmotor, no. 2, Feb. 25, 1922, pp. 5–6. Development of original Diesel engine; four- and two-stroke principles; fuel consumption; utilization of waste heat; etc.

Marine. Buffalo Builder Enters Diesel Field. Mar. Rev., vol. 52, no. 12, Dec. 1922, pp. 490–491, 3 figs. New marine Diesel engines built by H. G. Trout Co. for smaller sizes of boats.

Testing a 1000 Shaft Hp. Marine Oil Engine. Motorship, vol. 7, nos. 9, 10 and 12, Sept., Oct. and Dec. 1922, pp. 693, 772–773 and 938–939, 7 figs. Account of tests carried out by Cammell Laird & Co. in order to obtain data on (1) endurance and reliability of engine; (2) fuel consumption and thermodynamic conditions in engine under varying conditions; (3) ability of engine to operate under conditions usually found in tropical seas; and (4) ability of engine to operate successfully on ordinary boiler-fuel oils. See also Engineer, vol. 134, no. 3476, Aug. 11, 1922, pp. 140–142, 4 figs.

The Diesel Engine for the Merchant Marine (L'application des moteurs Diesel à la marine marchande), Jean Philippe. Technique Moderne, vol. 14, nos. 10 and 11, Oct. and Nov. 1922, pp. 411–418 and 462–466, 26 figs. Advantages of Diesel engine for propelling ships; number of cylinders; choice between 4-stroke and 2-stroke; detailed description of Diesel engines as installed on board ship; description of some French engines.

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Smidth, F. L. & Co.

Filters, Gravity
* Permutit Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Permutit Co.

Filters, Water
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fire Tube Boilers
(See Boilers, Return and Vertical Tubular)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
Martin-Morse Corp'n
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
Martin-Morse Corp'n
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* United States Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Hydraulic Press Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
Martin-Morse Corp'n
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.
Weatherly Foundry & Mfg. Co.

Fittings, Steel
* Crane Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Flanges
* American Spiral Pipe Works
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Furnace & Burner Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Forming Machines, Hydraulic
* Hydraulic Press Mfg. Co.

Foundry Equipment
Northern Engineering Works
Whiting Corporation

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnace Linings
(See Linings, Furnace)

Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co
Kenworthy, Chas. F. (Inc.)
Whiting Corporation

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Kenworthy, Chas. F. (Inc.)

Furnaces, Forging
Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co
Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co
Whiting Corporation

Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
* Johns-Manville (Inc.)

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Glasses
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Gages, Ball
* Atlas Ball Co.
* S K F Industries (Inc.)

Gages, Differential Pressure
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Draft
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Hydraulic Press Mfg. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Liquid Level
* Bristol Co.
* Lunkenheimer Co.
* Precision Instrument Co.

Gages, Loss of Head
* Builders Iron Foundry

Gages, Measuring (Surface, Depth, Dial, etc.)
* Atlas Ball Co.
* Norma Co. of America
* S K F Industries (Inc.)

Gages, Pressure
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Precision Instrument Co.

Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Water Level
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gas Analysis Apparatus
* Precision Instrument Co. (Inc.)

Gas Burners, Compressors, Engines, Exhausters, Producers, etc.
(See Burners, Compressors, Engines, Exhausters, Producers, etc., Gas)

Gas Collectors
* Precision Instrument Co. (Inc.)

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Rubber
Goodrich, B. F. Rubber Co.

Gasoline
Texas Co.

Gates, Blast
Link-Belt Co.

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.

Gears, Cut
Brown, A. & F. Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Poole Engrg. & Mch. Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Machine Moulded
Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.

Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.
Link-Belt Co.
Poole Engrg. & Mch. Co.

Gears, Worm
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
Link-Belt Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Ridgway Dynamo & Engine Co.

Governors, Gas
Equitable Meter Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Davis, G. M. Regulator Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co.

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave Brooks Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* McClave Brooks Co.
* Vogt, Henry Machine Co.

Solid-Injection. Using Tar Oil in Solid Injection Engines, H. F. Shepherd. Power, vol. 56, no. 24, Dec. 12, 1922, p. 939, 2 figs. Details of Crossley cold starting airless injection engine fitted for burning tar oils.

Stephen-Sulzer. The Stephen-Sulzer Two-Cycle Marine Diesel Engine. Mar. Engr. & Naval Architect, vol. 45, no. 542, Nov. 1922, pp. 423–425 and 436, 4 figs. partly on p. 422. Constructional features of 4-cylinder marine engine; two 400-b.hp. auxiliary generating engines; particulars of seven days' shop trials.

Stockport. The Super-Diesel "Stockport" (Le moteur super-Diesel "Stockport"), Ed. Bruet. Outillage, vol. 6, no. 44, Nov. 4, 1922, pp. 1475–1477, 7 figs. Represents furthest advancement in Diesel engines; uses any oil; describes its action, atomizing and injection of fuel, operation and lubrication.

DRAWINGS

Tool Parts. Part Drawings and Organization, Fred Hermon. Machy. (Lond.), vol. 21, no. 529, Nov. 16, 1922, pp. 198–199, 3 figs. Description of well-organized part system, with notes on laying out of part drawings in concise and easily readable form.

DRILLING MACHINES

Horizontal. Small Horizontal Drilling Machines, F. Osgood Hickling. Machy. (Lond.), vol. 21, no. 528, Nov. 9, 1922, pp. 173–175, 4 figs. Their application to production of brake shoes, clutch cones and wire-wheel rims.

DROP FORGING

Plants. An American Drop Forging Plant. Eng. Production, vol. 5, no. 112, Nov. 23, 1922, pp. 492–497, 18 figs. Works and methods employed by J. H. Williams & Co., Brooklyn.

DURALUMIN

Automotive Applications. Duralumin, R. W. Daniels. Soc. Automotive Engrs.—J., vol. 11, no. 6, Dec. 1922, pp. 477–480 and 490. History and general description of duralumin; Navy specification of its physical properties as drawn by Naval Aircraft Factory; manufacture; physical properties for annealed, heat-treated and hard-rolled duralumin and possible automotive applications, including worm-wheels, bearings, gears, connecting rods, rims and wheel parts and chassis and body trimming. Includes report of research department of Fifth Ave. Coach Co. on results of test made on duralumin wormwheels.

Properties. Duralumin—Its Properties and Commercial Possibilities, William B. Stout. Am. Soc. for Steel Treating—Trans., vol. 3, no. 2, Nov. 1922, pp. 226–230. Composition and physical properties; some of its drawbacks, which must be overcome.

DUST

Milling Plants. Dust in Milling Plants, M. W. Bernewitz. Eng. & Min. J.—Press, vol. 114, no. 25, Dec. 16, 1922, pp. 1070–1071, 1 fig. Author's experience at the Golden Mine of Kalgoorlie, West Australia, and suggestions based thereon.

Removal by Gravity. Dust Elimination by Means of Gravity (Staubbekämpfung mittels Schwerkraft), Karl Wiest. Stahl u. Eisen, vol. 42, no. 44, Nov. 2, 1922, pp. 1650–1653, 4 figs. Falling speed of dust particles; settling of dust; law for effectiveness of a dust chamber; vertical pipes, dust bins, and their arrangement; chimneys.

E

EDUCATION, ENGINEERING

Coöperative. Coöperative Engineering Education, K. C. Matheson. Engrs. & Eng., vol. 39, no. 11, Nov. 1922, pp. 384–385. Plan is for two men to enroll together, one for student working for stated period in shop or factory, his partner, in meantime, assuming his studies in college; at end of period, they alternate. Plan as adopted in various colleges.

ELECTRIC FURNACES

Hawley. Hawley Electric Furnace. Metal Industry, (N. Y.), vol. 20, no. 11, Nov. 1922, p. 425, 2 figs. New furnace based on use of indirect arc in body of oil-burning furnace body.

Pilot-Light Control. Arc Regulation in Electric Furnaces and Pilot Light Control, C. E. Sims. U. S. Bur. of Mines, Reports of Investigations, no. 2411, Nov. 1922, 2 pp., 1 fig. Describes apparatus used during experimental work in 300-lb. single-phase furnace of Heroult type used for melting iron and steel.

ELECTRIC LOCOMOTIVES

Midi Railway, France. The New D.C. Electric Locomotive of the Midi Railway (La nouvelle locomotive electrique à courant continu des Chemins de fer du Midi). Génie Civil, vol. 81, no. 20, Nov. 11, 1922, pp. 441–444, 5 figs. Detailed description of new locomotive intended for all kinds of traffic; 1000 to 1400 horsepower; weight, 72 tons; tractive effort, 15 tons; maximum speed, 90 km. per hr.

New Zealand Ry. New Electric Locomotives for the Midland Railway of New Zealand. Ry. Gaz., vol. 37, no. 21, Nov. 24, 1922, pp. 656–658, 2 figs. Two separate types, one for main-line working and another of battery type for general shunting and inspection service, constructed by English Elec. Co., Ltd.

0-4-4-0-Type. Electric Locomotives on the Metropolitan Railway. Ry. Engr., vol. 43, no. 515, Dec. 1922, pp. 457–462, 11 figs. 1200-hp. 0-4-4-0-type locomotives for heavy passenger traffic between Aldgate and Harrow.

Single-Phase. Single-Phase Express Passenger Locomotives with Individual Axle Drive. Ry. Gaz., vol. 37, no. 22, Dec. 1, 1922, pp. 707–709, 6 figs. Designed and built by Brown, Boveri & Co., Baden, for Swiss Federal Railways.

S. African Railways. Electric Locomotives for South African Railways. Ry. Gaz., vol. 37, no. 21, Nov. 24, 1922, pp. 655 and 662, 1 fig. So designed that they can be worked alone or with other locomotives in multiple unit controlled by one driver.

ELECTRIC RAILWAYS

Germany. Electric Traction on the German State Railway (Die elektrische Zugförderung der Deutschen Reichsbahn), W. Wechmann. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 46–47, Nov. 18, 1922, pp. 1053–1059, 17 figs. Fundamentals for adoption and extension; the five existing electric trunk lines; development in Bavaria, Central Germany and Silesia; power stations, simple locomotives; urban and suburban railways.

ELECTRIC WELDING, ARC

Quasi-Arc Process. Electric Welding in Structural Work. Times Trade & Eng. Supp., vol. 11, no. 228, Nov. 18, 1922, p. 235, 1 fig. Substitution of welding by Quasi-Arc process for riveting in construction of three gas holders at Melbourne.

Shipbuilding. Electric Welding in Shipbuilding (Die elektrische Schweissung im Schiffbau), W. Strelow. Schiffbau, vol. 24, no. 7–8, Nov. 15–22, 1922, pp. 101–107, 6 figs. Development and advantages of electric arc welding. Describes patented method employed in construction of a motor tug, 14 m. long and 3.3 m. wide.

ELEVATORS

Electrification. Economic Value of Elevator Electrification, W. H. Whitton. Elec. World, vol. 80, no. 25, Dec. 16, 1922, pp. 1325–1328, 4 figs. Importance to user and central station; economy of change-over; greater safety, speed, smoothness and average mileage claimed.

EMPLOYEES' REPRESENTATION

Pa. R. R. Plan. How Pennsylvania Railroad Keeps Peace With Its Employees, H. A. Enochs. Ry. Rev., vol. 71, no. 23, Dec. 2, 1922, pp. 787–789. Investigation putting responsibility where it belongs under equitable plan of rule averts strife.

EMPLOYMENT MANAGEMENT

Labor Performance Sheet. A Labor Performance Sheet That Serves a Fourfold Purpose. Factory, vol. 29, no. 3, Sept. 1922, pp. 251–252, 1 fig. Reproduces simple sheet for keeping of individual production records.

ENGINEERING SOCIETIES

Research. Research for Engineering Societies, Alfred D. Flinn. Am. Soc. for Steel Treating—Trans., vol. 3, no. 2, Nov. 1922, pp. 218–225. Aims and agencies. Describe coöperation of Engineering Foundation and National Research Council.

EVAPORATORS

Triple-Effect. Evaporation—A Study of the Various Operating Cycles In Triple Effect Units, A. L. Weber. Chem. & Met. Eng., vol. 27, no. 22, Nov. 29, 1922, pp. 1073–1078, 10 figs. General method of discovering best operating cycle for triple-effect evaporators. "Heat balance" worked out for sample case.

Vacuum. The BB-Vacuum Evaporator as Feedwater Producer (Die BB-Vakuumverdampfer als Speisewassererzeuger und ihre Anwendung in der Wärmewirtschaft), R. Klein. Wärme, vol. 45, nos. 43 and 44, Nov. 3 and 10, 1922, pp. 519–522 and 534–537, 10 figs. Design and operation of evaporator and calculation of its economic efficiency for various applications; practical results obtained; examples of possible applications with regard to utilization of exhaust steam, waste heat and hot water.

EXHAUST STEAM

Utilization. Calculations for Waste-Steam Utilization Plants (Zur Berechnung von Abdampfverwertungsanlagen), Otto Ginsberg. Gesundheits-Ingenieur, vol. 45, no. 44, Nov. 4, 1922, pp. 545–547. Gives table of entropy values and examples of calculation.

F

FABRICS

Testing. Mechanical Testing of Fiber, Spun and Woven Fabrics (Mechanische Prüfung von Faserstoffen, Gespinsten und Geweben), G. Böhm. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 45, Nov. 11, 1922, pp. 1041–1043, 8 figs. Machines for testing of strength of fabrics.

FATIGUE

Industrial. The Relation of Fatigue Elimination to Other Activities, Frank B. and L. M. Gilbreth. Indus. Management (Lond.), vol. 8, no. 10, Nov. 30, 1922, pp. 311–312, 1 fig. Application of "Magster" three-dimension daylight kinematograph to motion study. (Abstract.) Paper presented before Soc. Indus. Engrs.

FERROCHROMIUM

Decarburizing by Hydrogen. Decarburizing Ferrochromium by Hydrogen, Louis Jordan and F. E. Swindells. Chem. & Met. Eng., vol. 27, no. 22, Nov. 29, 1922, pp. 1071–1072. Preliminary tests indicate that most promising condition for refining high-carbon alloy by this method is probably by blowing molten alloy with blast of hydrogen in a converter.

FLOW OF GASES

Pipes. The Flow of Gases in Pipes (Ueber das Strömen von Gasen in Röhren), R. Seeliger and G. Mierdel. Gas- u. Wasserfach, vol. 65, nos. 39 and 40, Sept. 30, and Oct. 7, 1922, pp. 618–621 and 635–640, 4 figs. Explanation of internal friction; the Poiseuille law for laminary flow; measurement of friction coefficients of gases; turbulent flow; formulas.

FLOW OF WATER

Measurement. Gaging Rivers of Medium Flow (Aforos de rios de caudal pequeño), E. Callego. Energia Electrica, vol. 24, nos. 8, 9 and 10, Apr. 25, May 10 and 25, 1922, pp. 85–90, 101–107 and 117–124, 19 figs. Discusses gaging of open flow by means of orifices and weirs, and formulas for each type; gives tables of values for calculations. Details of work of Spanish commission appointed by Ministry of Public Works to report on water resources and hydraulic conditions of rivers in Spain.

Pipe Losses. A New Formula for Computing Pipe Losses, Charles I. Corp. Wisconsin Engr., vol. 27, no. 2, Nov. 1922, pp. 25–27 and 37, 6 figs. Data on experiments conducted at Hydraulic Laboratory of Univ. of Wisconsin on loss due to flow in wrought-iron pipes to determine loss of head caused by valves; effect of diameter on loss of head.

FLUE-GAS ANALYSIS

Testing Apparatus. An Electric Measuring Apparatus for Determining Carbonic-Acid Content of Flue Gases (Ein elektrisches Betriebs-Messgerat fur den Kohlensäuregehalt von Rauchgasen), G. Quaink. Dinglers polytechnisches Jl., vol. 337, no. 19, Sept. 23, 1922, pp. 197–198, 5 figs. New flue-gas tester put on market by Siemens & Halske, which, like manometer, is attached to front wall of boiler, and with which CO_2 content can be read at a glance.

FLYING BOATS

Dornier Double-Engine Plant. The Dornier Double-Engine Plant for Large Flying Boats (Die Dornier-Zweimotorenanlage fur Grossflugboote), G. Meyer. Motorwagen, vol. 25, no. 28, Oct. 10, 1922, pp. 531–533, 1 fig. Points out disadvantages of former multi-engine plants and advantages of Dornier arrangement according to which engines are centrally located, each operating a propeller which is likewise centrally located.

FLYWHEELS

Calculation. Calculation of Flywheels (Berekening van vliegwielen), D. Dresden. Ingenieur, vol. 37, no. 41, Oct. 14, 1922, pp. 812–814, 3 figs. Peripheral velocities and pressures; coupled flywheels; belt tensions; etc.

Calculation of Flywheels (Le calcul des Volants). Metallurgie, vol. 54, nos. 47 and 48, Nov. 23 and 30, 1922, pp. 1747–1749 and 1785–1786. Function of flywheels and formulas for their calculation, determination of coefficient of uniformity; flywheels for 4-stroke gas engines.

FORGING

Hydraulic Presses. Types of Hydraulic Presses, W. R. Ward. Forging & Heat Treating, vol. 8, no. 11, Nov. 1922, pp. 511–516, 7 figs. Grouped into two main classes, those used in making die forgings and those that do general forge work similar to that done by hammers.

FOUNDRIES

Core Stoves. The "Hestia" Core Stove, J. M. Lockhart. Foundry Trade Jl., vol. 26, no. 325, Nov. 9, 1922, p. 375, 1 fig. New core and mold-drying stove, object of which is to do away with large volumes of black, sulphurous smoke and soot which pour into foundry whenever stove doors are opened.

Sanitary Enameled Ware. How Sanitary Ware Is Made, Pat Dwyer. Foundry, vol. 50, no. 24, Dec. 15, 1922, pp. 997–1002, 8 figs. Features involved in applying enamel; monorail system and 4-spout ladles greatly reduce time and effort required to pour oil flow of soil-pipe castings.

Technical Control. Technical Control of the McCook Field Foundry, E. H. Dix. Metal Industry (N. Y.), vol. 20, no. 11, Nov. 1922, pp. 426–429, 6 figs. System of control for foundry making aircraft castings. Paper read before Am. Foundrymen's Assn.

Tool-Checking System. Tool Checking Systems in Foundries, W. J. Sansom. Am. Mach., vol. 57, no. 21, Nov. 23, 1922, pp. 795–796, 2 figs. Identification numbers for patterns, loose parts, and core boxes; designating regular and special patterns; shelving and card indexes.

FOUNDRY MATERIALS

Iron-Percentage Estimation. Estimation of Minute Percentages of Iron in Foundry Materials. Foundry Trade Jl., vol. 26, no. 325, Nov. 9, 1922, p. 383. Investigations of sulphocyanide colorimetric method; usual method and method advocated.

FREIGHT HANDLING

Motor Trucks. New Ways of Freight Transportation (Neue Wege im Lastkraftverkehr), Paul Fladrich. Fördertechnik u. Frachtverkehr, vol. 15, no. 22, Oct. 27, 1922, pp. 285–288, 3 figs. Motor trucks and their application in freight transportation; trailers; etc. Gives examples.

Grates, Kiln
* McClave Brooks Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave Brooks Co.
* Springfield Boiler Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
Dixon, Joseph Crucible Co.
* Royersford Foundry & Machine Co.
Texas Co.
Vacuum Oil Co.

Grinding Machinery
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Foundry & Machine Co.

Grinding Machines, Internal
* Heald Machine Co.

Grinding Machines, Surface
* Heald Machine Co.

Guards (Electric Lamps)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Bliss, E. W. Co.
* Franklin Machine Co.
Long & Allstatter Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hangers, Shaft
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Foundry & Machine Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball and Roller Bearing)
* Jones, W. A. Fdry. & Mach. Co
* S K F Industries (Inc.)

Hardening
* American Metal Treatment Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

Heaters, Water Supply
Herbert Boiler Co.

Heaters, Water Supply (Garbage Burner)
Herbert Boiler Co.

Heaters & Mixers, Water, Instantaneous
Manufacturing Equipment & Engrg. Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.
* Erie City Iron Works
* H.S.B.W.-Cochrane Corp'n
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water Metering
* H.S.B.W.-Cochrane Corp'n

Heating Systems, Vacuum
* Illinois Engineering Co.

Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
Clarage Fan Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.

Hoists, Air
* Ingersoll-Rand Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corporation

Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n

Hoists, Electric
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Electric Crane & Hoist Co.

Hoists, Friction
Eastern Machinery Co.

Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.
Western Machinery Co.

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Mine
Lidgerwood Mfg. Co.
Western Machinery Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Hoists, Steam
(See Engines, Hoisting)

Holders, Nipple
Curtis & Curtis Co.

Hose, Air and Gas
Goodrich, B. F. Rubber Co.

Hose, Gasoline
Goodrich, B. F. Rubber Co.

Hose, Metallic
* Johns-Manville (Inc.)

Hose, Water
Goodrich, B. F. Rubber Co.

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n

Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Worthington Pump & Machinery Corp'n

Hydraulic Machinery
* Allis-Chalmers Mfg. Co.
Hydraulic Press Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Rams, Presses, Turbines, etc.
(See Rams, Presses, Turbines, etc., Hydraulic)

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
Taylor Instrument Cos.

Hygrometers
Taylor Instrument Cos.

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Gifford-Wood Co.

Idlers (Lenix)
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Indicators, CO_2
Bacharach Industrial Instrument Co.
Brinckerhoff, H. Gordon Co
* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.

Indicators, Engine
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Indicators, Speed
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co

Injectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Instruments, Electrical Measuring
* General Electric Co.
Taylor Instrument Cos.
Weston Electrical Instrument Co.

Instruments, Recording
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* General Electric Co.
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Instruments, Scientific
Taylor Instrument Cos.

Instruments, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Insulating Materials (Electric)
* General Electric Co.
* Johns-Manville (Inc.)

Insulating Materials(Heat and Cold)
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
* Illinois Engineering Co.
* Lunkenheimer Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.

Keys, Machine
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Ladles
Northern Engineering Works
Whiting Corporation

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
* Johns-Manville (Inc.)

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Levers, Flexible (Wire)
* Gwilliam Co.

Lightning Arresters
* General Electric Co.

Linings, Brake
* Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Furnace & Burner Corp'n
Brinckerhoff, H. Gordon Co.
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Linings, Stack
* Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n

Loaders, Portable
Link-Belt Co.

Loaders, Wagon
* Gifford-Wood Co.
Link-Belt Co.

Lockers, Metal
Manufacturing Equipment & Engrg. Co.

Locomotives, Electric
* General Electric Co.

Locomotives, Storage Battery
* General Electric Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.

Machine Work
Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Lammert & Mann Co.
Link-Belt Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.

Mechanical Draft Apparatus
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Mechanical Stokers
(See Stokers)

Metal Cutting Machines
(See Cutting-off Machines, Metal)

Metal Equipment
Manufacturing Equipment & Engrg. Co.

Metal Reclaiming Mills
(See Mills, Metal Reclaiming)

Metal Treating
* American Metal Treatment Co.

Metals, Bearing
American Crucible Products Co.
* General Electric Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meter Provers
Equitable Meter Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

FRICTION

Static. The Theory of Static Friction, R. M. Deeley. Engineer, vol. 134, no. 3493, Dec. 8, 1922, pp. 610–611. Outline of tentative theory which may account for phenomena met with.

FUELS

Bituminous Coal. Economical Use of Bituminous Fuels, John B. C. Kershaw. Elec. World, vol. 80, no. 25, Dec. 16, 1922, pp. 1317–1324, 16 figs. Conditions essential to insure high degree of efficiency and absence of smoke and unconsumed gas; choice of boilers; inclined and stepped grates; gas and coal-dust firing.

Economical Use. Organization of Fuel Economies in Industries (L'Organisation des économies de combustible dans l'industrie), P. Mahler. Chaleur & Industrie, vol. 3, no. 29, Sept. 1922, pp. 1614–1620. Report to Interministerial Committee for Utilization of Fuels. Measures taken at Homecourt, Creusot and other works to eliminate waste. Details of cases where reduction in fuel consumption amounting to as high as 60 per cent was effected by better study of furnaces or control of combustion. See also Revue Generale de l'Electricité, vol. 12, nos. 18 and 19, Nov. 4 and 11, 1922, pp. 688–693 and 734–740; Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 134, no. 8, Aug.-Oct.1922, pp. 817–838; and Associations Françaises de Propriétaires d'Appareils à Vapeur—Bul., vol. 3, no. 10, Oct. 1922, pp. 210–220.

Low-Grade. Using Low-Grade Fuel at the Montrambert and Beraudiere Collieries [Note sur l'utilisation des combustibles de faible valeur aux houillères de Montrambert et de la Beraudière (Saint-Etienne)], Andre Pigot and Francois Blache. Revue de Metallurgie, vol. 19, no. 11, Nov. 1922, pp. 665–671, 2 figs. Results of experiments showing advantage of coking followed by gas production in gas producers for gas engines.

[See also COAL; PULVERIZED COAL.]

FURNACES, BOILER

Excess-Air Losses. Modern Management Methods in the Power Plant, Browning Robinson. Indus. Management (N. Y.), vol. 64, no. 6, Dec. 1922, pp. 346–349. Excess air said to be principal cause of heaviest losses.

Forced Draft. "Forced Draft with High-Grade Anthracite"—"Anthracite and Forced Draft" ("Unterwind bei hochwertigen Steinkohlen—"Steinkohlen und Unterwind"), Hch. Doevenspeck. Wärme, vol. 45, no. 39, Oct. 6, 1922, pp. 473–476. Writer maintains claim made that forced draft improves combustion has not been once theoretically sustained; and various assertions concerning suction draft, additional heating surfaces, throttling of wet steam, etc., should be corrected.

Oil-Fired. The New Körting Oil Furnaces and Their Use for Mine Locomotives (Die neuen Körting-Oelfeuerungen auch fur Grubenlokomotiven), H. Pradel. Braunkohle, vol. 21, no. 33, Nov. 18, 1922, pp. 573–578, 8 figs. Oil furnaces with steam-jet or compressed-air centrifugal spraying; steam-jet sprayer as additional firing.

Preheating Combustion Air. The Preheating of Combustion Air for Boiler and Industrial Furnaces (Die Vowarmung der Verbrennungsluft fur Kessel- und industrielle Feuerungen), L. Finckh. Wärme, vol. 45, no. 44, Nov. 10, 1922, pp. 531–533. Influence and possibilities of preheating; calculation of possible heating of air; desiderata for installation of air heaters; tables showing saving effected by preheating of combustion air.

Stokeholes. Theory and Design of Furnace Stokeholes, Zuce Kogan. Power Plant Eng., vol. 26, no. 24, Dec. 15, 1922, pp. 1193–1196, 6 figs. Design and manner of locating stokeholes and their effect on furnace conditions.

Wood-Waste-Burning. A New Furnace for Burning Wood Waste (Eine neue Spänefeuerung), H. Pradel. Wärme, vol. 45, no. 40, Oct. 13, 1922, p. 490, 2 figs. New Adler & Hentzen furnace with inclined nozzle-plate grate, attached tilting grate and arrangement for removal of shavings from funnel and distribution on grate.

FURNACES, HOT-AIR

Economic Design. Economy in Modern Furnace Practice. Sheet Metal Worker, vol. 13, no. 23, Dec. 8, 1922, pp. 757–759, 3 figs. Method by which requirements may be quickly calculated on sound engineering basis and outfit ordered complete in one shipment. Furnace system designed by Haynes-Langenberg Mfg. Co. for heating double residence.

FURNACES, INDUSTRIAL

Firing. Industrial Heating (La Science du chauffage industriel), C.-M. Stein. Revue de Métallurgie, vol. 19, no. 10, Oct. 1922, pp. 579–589. Temperature measurement; pyrometry and types of pyrometers; gasification of fuel; combustion; heat transmission and radiation; refractories.

FURNACES, METALLURGICAL

Copper and Brass-Melting. Fuels and Furnaces for Melting Copper and Brass Alloys, T. H. A. Eastick. Brass World, vol. 18, no. 11, Nov. 1922, pp. 340–341. Economic value of fuels; types and selection of furnaces. Paper read before Am. Foundrymen's Assn.

Malleable-Iron. Builds New Type Malleable Furnaces, Herbert R. Simonds. Iron Trade Rev., vol. 57, no. 22, Nov. 30, 1922, pp. 1493–1495, 3 figs. Describes 18-ton furnaces built at plant of Arcade Malleable Iron Co., Worcester, Mass.

FURNACES, REVERBERATORY

Non-Ferrous Metals. Reverberatory Furnace for Non-Ferrous Metals. Foundry Trade Jl., vol. 26, no. 325, Nov. 9, 1922, pp. 384–385, 1 fig. Details of air-blast reverberatory furnace installed by Worthington-Simpson, Ltd., in their Newark works. Advantages and demonstration results.

G

GAGES

Limit. The Theory of Limit Gages (Teoría de los calibres límites), José M. Fernandez de Castro y Alonso. Asociación de Ingenieros del Instituto Católico de Artes e Industrias—Anales, vol. 1, no. 4, 1922, pp. 273–280, 5 figs. Discusses limit gages in connection with manufacture in quantity, tolerances, and errors in calculations.

GAS CLEANING

Electrical and Centrifugal. Removal of Solid and Liquid Particles From Gases, A. F. Nesbitt. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1922, pp. 637–641, 6 figs. Experiments in removing dust from blast-furnace gas, and pitchy and tarry particles from combustion gases; types of combined electrical and centrifugal, and of centrifugal gas cleaners.

GAS ENGINES

Small Naval Boats. Navy Yard Makes Gas Engines, S. W. Brinson. Foundry, vol. 50, no. 24, Dec. 15, 1922, pp. 984–986, 7 figs. To meet increased demand for this type of engine designed for use in all smaller naval boats equipment was provided for pouring 60 cylinders a day.

Suction-Gas Plant. Suction-Gas Plant. Indian & East. Engr., vol. 50, no. 6, June 1922, pp. 300–303, 3 figs. A gas engine, gas being produced in generator alongside engine. Fuel for suction-gas plant; describes steam plant, principle on which suction gas is made, generator, various methods for supplying steam, scrubbers, starting and running, leakages and firebrick blocks.

GAS PRODUCERS

Central vs. Individual. Single Producers vs. Central-Type Producers (Einzelgenerator oder Zentralgenerator), L. Litinsky. Gas- u. Wasserfach, vol. 65, no. 39, Sept. 30, 1922, pp. 621–626, 3 figs. Advantages and disadvantages of both systems are given in tabular form. Relative efficiency with regard to waste-heat recovery, quality of gas, combustion temperatures, use of low grade fuels and lignite, dust content, space requirement and wages.

Heat Economy in. Heat Economy in Gas-Producer Practice (Wärmeersparnisse im Gaserzeugerbetrieb), H. R. Trenkler. Archiv fur Wärmewirtschaft, vol. 3, nos. 10 and 11, Oct. and Nov., 1922, pp. 193–196 and 207–211, 3 figs. Discusses general principles for control of operation. Notes on examinations and measurements; recording apparatus for continuous testing.

Operation. Gas Producers at the Breuil Works of Schneider & Co. (Gazogènes de l'usine du Breuil de MM. Schneider & Cie.), J. Cohade. Revue de l'Industrie Minérale, no. 45, Nov. 1, 1922, pp. 573–586, 6 figs. Describes gas producer plants at Breuil, near Creusot (France), for supplying Martin steel works, containing 6 furnaces of 60 tons and two of 30 tons; their operation and results obtained.

Preheated-Air. Using Ash-Fusing Gas Producers Supplied With Preheated Air (L'utilisation des combustibles dans les gazogènes à fusion de cendres soufflés au vent chaud), Auguste Dessemond. Revue de Métallurgie, vol. 19, no. 11, Nov. 1922, pp. 656–664, 5 figs. Operated by Société des Houillères de Saint-Etienne, for burning coal waste containing over 50 per cent ash; result of working.

Refuse-Burning. British Practice in Deriving Gas Power from Wood Refuse, C. H. S. Tupholme. Power Plant Eng., vol. 26, no. 24, Dec. 15, 1922, pp. 1206–1208, 2 figs. Describes number of leading makes of gas producers which use wood or vegetable refuse for fuel.

GASOLINE

Natural-Gas. Some Recent Developments in the Manufacture of Natural Gas Gasoline, F. E. Hosmer and F. M. Seibert. Jl. Indus. & Eng. Chem., vol. 14, no. 12, Dec. 1922, pp. 1106–1111, 4 figs. Methods for recovering gasoline from casinghead gas; absorption methods are believed to be most practical.

GEAR CUTTING

Bevel Gears. Roughing Bevel Gears and Pinions, Franklin D. Jones. Machy. (N. Y.), vol. 29, no. 4, Dec. 1922, pp. 287–292, 14 figs. Describes several types of Gould & Eberhardt roughing machines, and methods of roughing.

Hobbing. Hobbing Silent Timing Gears of Condesite Celoron, M. E. Dalton. Can. Mfr., vol. 42, no. 11, Nov. 1922, pp. 25–26. Hints and practical information on gear hobbing. Condesite Celoron is non-metallic gear-cutting material which is practically water, oil and grease-proof and produces silent gears.

Spiral-Type Bevel Gears. Cutting Spiral-type Bevel Gears. Machy. (Lond.), vol. 21, no. 530, Nov. 23, 1922, pp. 242–247, 8 figs. Principles of cutting; operation and adjustment of generators designed for cutting gears of different sizes.

GEARS

Helical. A New System of Helical Involute Gearing for Use on Metal Planers, Forrest E. Cardullo. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 816–817 and 873, 2 figs. Particulars of system of helical gearing designed by author, in which directions of rotation and helical angles of several gears are so chosen as to counterbalance and minimize end thrust; advantages. (Abridged.)

Tangent-Rack. The Hotchkiss-Taylor System of Gearing. Machy. (Lond.), vol. 21, no. 531, Nov. 30, 1922, pp. 276–278, 5 figs. Details of machine for generating tangent-rack gears.

Testing Teeth. A New Method for Determining the Effect of Speed upon the Strength of Gear Teeth, Wilfred Lewis. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 813–815, 4 figs. Apparatus devised by C. H. Logue in 1920 to measure differentials in velocity ratios and increment loads as related to mass and speed computed by him. Gear tester develops capabilities not originally contemplated and proves valuable both as instrument for describing diagrams and for measuring exactly relation of speed to pressure in loss of initial load.

GRINDING

Linoleum. A Novel Grinding Process. Eng. Production, vol. 5, no. 109, Nov. 2, 1922, p. 422, 1 fig. New application of A. E. W. grinding wheels for finishing inlaid linoleum and other similar materials.

GRINDING MACHINES

Heavy-Duty. Grinder Finishes Machine Ways, A. R. Ludewigs. Iron Trade Rev., vol. 57, no. 21, Nov. 23, 1922, pp. 1415–1416, 5 figs. Flat bearing surfaces on machine-tool beds are generated accurately on special heavy-duty grinding machine, making scraping unnecessary; details of method.

Package Conveyors. What It Pays to Know About Material Handling, W. T. Spivey. Factory, vol. 29, no. 3, Sept. 1922, pp. 244–247 and 284–286, 8 figs. Power-driven conveyors best suited to handling of packages, boxes, or pieces.

H

HANDLING MATERIALS

Overhead Runways. The Louden-King Overhead Runway System. Engineer, vol. 134, no. 3492, Dec. 1, 1922, p. 588, 5 figs. Describes installation at works of Brit. Tabulating Machine Co., designed to handle rolls of paper received at works for cutting up into tabulating cards.

HEAT TRANSMISSION

Conduction and Convection. Heat Transfer by Conduction and Convection, W. H. McAdams and T. H. Frost. Jl. Indus. & Eng. Chem., vol. 14, no. 12, Dec. 1922, pp. 1101–1105, 3 figs. Liquids flowing through pipes. Review of literature, including Reynolds' analogy between heat transfer and friction; simplified form of theoretical Boussinesq equation is proposed; fouling of pipes is discussed and factor of safety suggested.

Determination. Modern Methods and Investigation Results for Determination of Heat Transmission (Neuere Methoden und Forschungsernebnisse zur Bestimmung des Wärmedurchganges), Oscar Knoblauch. Zeit. fur die gesamte Kälte-Industrie, vol. 29, no. 10, Oct. 1922, pp. 177–183, 7 figs. Research methods and results of observations in the Munich Laboratory for Technical Physics.

Radiation and Convection. Transmission of Heat by Radiation and Convection. Engineering, vol. 114, no. 2970, Dec. 1, 1922, pp. 672–673, 6 figs. Results of investigation by Ezer Griffiths and A. H. Davis of cold-storage problems, conducted on behalf of Food Investigation Board and Nat. Physical Laboratory.

HEATING AND VENTILATION

Investigative Work. Investigative Work at the A. S. H.-V. E. Research Laboratory, F. Paul Anderson. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 28, no. 8, Nov. 1922, pp. 773–787, 18 figs. Critical velocity tests. Comfort and physiological effects of air conditions. Development of the Anderson and Armspach dust determinator.

HEATING, ELECTRIC

Steel Industry. Electric Heating Applied to the Steel Industry, F. A. Hansen. Assn. Iron & Steel Elec. Engrs., vol. 4, no. 11, Nov. 1922, pp. 765–777. Deals with resistance type of electric heaters. Industrial heating appliances; low-temperature ovens; electric furnaces.

HEATING, HOUSE

France. Central House Heating (Du chauffage central), E. Allar. Associations Françaises de Propriétaires d'Appareils à Vapeur—Bul., vol. 3, no. 10, Oct. 1922, pp. 185–201, 9 figs. Describes different systems, including steam heating and hot-water heating; boilers and combustion; fuel consumption and temperature.

HEATING, STEAM

Hot-Water and. Dynamic Phenomena in Central Hot-Water and Low-Pressure Steam Heating (Dynamische Erscheinungen in der Zentralwarmwasser- und Niederdruckdampfheizung), K. Jahn. Wärme, vol. 45, nos. 35, 36, 38, 40 and 41, Sept. 8, 15, 29, Oct. 13 and 20, 1922, pp. 425–429, 443–444, 463–465, 487–489 and 499–500, 9 figs. Information on complicated relations of such central-heating plants, which at present are statically calculated. Part 1: Notes on construction parts and their effect on circulation and economy. Part 2: Circulation problem. Part 3: Difficulties in circulation of hot-water heaters. Part 4: Circulation of low-pressure steam heaters. Part 5: Bases for reliable circulation, in order to obtain economical operation.

Meters, Electric
* General Electric Co.
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* Precision Instrument Co. (Inc.)
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* Spray Engineering Co.

Meters, Gas
Equitable Meter Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.

Meters, Water
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* National Meter Co.
* Worthington Pump & Machinery Corp'n

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ridgway Dynamo & Engine Co.

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Shepard Electric Crane & Hoist Co.

Motors, Synchronous
* Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Non-Return Valves
(See Valves, Non-Return)

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Nuts, Machine Screw (Steel & Brass)
* Reed & Prince Mfg. Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Lunkenheimer Co.

Oil and Grease Guns
* Royersford Foundry & Machine Co.

Oil Burners, Engines, Filters, Pumps, Separators, etc.
(See Burners, Engines, Filters, Pumps, Separators, etc., Oil)

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Improved Equipment Co.
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Tanks
* Scaife, Wm. B. & Sons Co.

Oil Well Machinery
* Brownell Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Oilers, Sight Feed
* Lunkenheimer Co.

Oiling Devices
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oiling Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oils, Fuel
Texas Co.

Oils, Lubricating
Texas Co.
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.
Link-Belt Co.

Ovens, Core
Whiting Corporation

Overhead Track System
(See Tramrail Systems, Overhead)

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
Linde air Products Co.

Packing, Ammonia
France Packing Co
Goodrich, B. F. Rubber Co

Packing, Asbestos
Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rubber
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)

Packing, Sheet
* Goetze Gasket & Packing Co.
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Paint, Metal
* General Electric Co.
* Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paper Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
DuPont Engineering Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
Dixon, Joseph Crucible Co.
Keuffel & Esser Co.

Penstocks
Smith, S. Morgan Co.

Perforated Metals
(See Metals, Perforated)

Petroleum Products
Texas Co.

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* United States Cast Iron Pipe & Fdry. Co.
Weatherly Foundry & Mfg. Co.

Pipe, Riveted
* American Spiral Pipe Wks.
* Walsh & Weidner Boiler Co.

Pipe, Riveted Steel
* Springfield Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe Welded
* American Spiral Pipe Wks.
* Crane Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Bending Machines
* Hydraulic Press Mfg. Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Pipe Joint Clamps
(See Clamps, Pipe Joint)

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Plate Metal Work
(See Steel Plate Construction)

Pneumatic Tools, Tubes, etc.
(See Tools, Tubes, etc., Pneumatic)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Foundry & Machine Co.

Poppet Valve Engines
(See Engines, Steam, Poppet Valve)

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Eastern Machinery Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Morse Chain Co.
Poole Engrg. & Mch. Co.
* Royersford Foundry & Machine Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
* Hydraulic Press Mfg. Co.
Philadelphia Drying Machinery Co.

Presses, Blanking
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.

Presses, Draw
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.

Presses, Embossing
* Hydraulic Press Mfg. Co.

Presses, Extruding
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.

Presses, Foot
* Bliss, E. W. Co.
* Royersford Foundry & Machine Co.

Presses, Forging
* Bliss, E. W. Co.
* Hydraulic Press Mfg. Co.

Presses, Forming
* Hydraulic Press Mfg. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
* Hydraulic Press Mfg. Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Machinery Co.

Presses, Punching and Trimming
* Bliss, E. W. Co.
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Presses, Sheet Metal Working
* Bliss, E. W. Co.

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Worthington Pump & Machy Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Eastern Machinery Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Machine Co.
Link-Belt Co.
* Medart Co.
Wood's, T. B. & Sons Co.

Pulleys, Iron
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
Kenworthy, Chas. F. (Inc.)

Pulverized Fuel Feeders
(See Feeders, Pulverized Fuel)

Pulverizers
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc., Pump)

Vacuum. Vapor Heating Systems, E. R. Pierce. Domestic Eng., vol. 101, nos. 5, 7, and 9, Nov. 4, 18 and Dec. 2, 1922, pp. 173–175, 273–275, 365–367 and 402, 8 figs. Treatise on vapor and vacuum heating. Describes Gorton, Moline, Dunham vapor, McLear air-line vacuum, and vacuum-pump heating systems.

HELICOPTERS

Theory. Helicopters, John Case. Aeronautical Jl., vol. 26, nos. 142 and 143, Oct. and Nov., 1922, pp. 390–407 and 435–447, 20 figs. Results of attempt to investigate theoretical possibilities and to develop some branches of theory of helicopters. Notes on airscrews for helicopters; consideration of dynamics of helicopter flight and development of stability equations.

HYDRAULIC TURBINES

Efficiency. Thermometric Methods of Measuring the Efficiency of Hydraulic Turbines (Méthode thermométrique de Mesure de Rendement des Turbines hydrauliques), E. Poirson. Houille Blanche, vol. 21, no. 69-70, Sept.-Oct. 1922, pp. 155–157, 1 fig. Discusses system of Barbillion and Poirson; causes of errors in its application; variation of temperature of water; etc.

Testing Station. A New Hydraulic-Turbine Experimental Station (Die neue Wasserturbinen-Versuchanstalt der A.-G. der Maschinenfabriken von Escher Wyss & Cie), Robert Dubs. Schweizerische Bauzeitung, vol. 80, no. 21, Nov. 18, 1922, pp. 235–241, 10 figs. New testing station erected by Escher Wyss & Cie at Zurich, Switzerland, with artificial water power for examination of rotors, guide apparatus, draft tubes, etc.

Types. Water Power and Hydraulic Turbines. Indian & East. Engr., vol. 50, nos. 3, 4, 5 and 6, Mar., Apr., May and June 1922, pp. 118–120, 185–186, 219–222 and 279–285, 21 figs. Possibilities of water-power as commercial proposition; notes on power houses, sluices and controls, supply canals, pipe lines, anchorages, high and low pressure turbines, selection of types of turbines, reaction and impulse types; Pelton wheels, Francis turbines, stock pattern turbines, governors, gates, etc.

Vertical. Hydroelectric Plants with Vertical Turbines, Gear Drives and Vertical-Shaft Generators (Wasserkraftanlagen mit stehenden Turbinen, Zahnrädergetrieben und Schirmdynamos), E. Treiber. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 28-29, July 22, 1922, pp. 716–717, 4 figs. Details and economy of such installations.

HYDROELECTRIC DEVELOPMENTS

Canada. Hydro-Electric Power Development in Canada. Engineering, vol. 114, no. 2968, Nov. 17, 1922, pp. 607–609. Review of new power units, indicating progress made.

HYDROELCTRIC PLANTS

Low-Head. The Development of Small Water-Powers and Low Falls, A. H. Gibson. Elec. Rev., vol. 91, no. 2347, Nov. 17, 1922, pp. 730–732. Development of water powers from 10 to 200 hp. Points out that to make best use of average small water-power scheme, it should be used in combination with steam, gas, or oil fuel plant; operation and economy of such combined plant.

New England. Building a 6500 Hp. Water Power Plant in New England, J. Arthur Garrod. Eng. News-Rec., vol. 89, no. 24, Dec. 14, 1922, pp. 1017–1020, 4 figs. Work on Searsburg development of Deerfield River involved earth dam and 4-mi. wood-stave pipe line.

Norway. A Low-Head Hydro-Electric Plant of 84,000 Hp. in Norway, W. Francis Lloyd. Eng. News-Rec., vol. 89, no. 21, Nov. 23, 1922, pp. 873–874, 4 figs. Development at Raanaasfos, on Glommen River, illustrative of modern European practice; involves large roller dam and novel timber chute.

Operating Instructions. Operating Instructions for Hydro-Electric Stations, Ralph Brown. Power, vol. 56, no. 22, Nov. 28, 1922, pp. 830–832. Writing operating instructions; methods of operation; putting main units on system; on hand control a 12,000-kva. unit has been started and paralleled with other machines in 45 sec.

Small, Remote Control of. Remote Control for Small Plants, E. S. Lincoln. Elec. World, vol. 80, no. 23, Dec. 2, 1922, pp. 1201–1204, 5 figs. How parallel operation of two small hydraulic plants was made possible without excessive cost to take care of load suddenly increased by war requirements.

I

ICE MANUFACTURE

Freezing Methods. Methods of Freezing Raw Water, Halbert Paul Hill. Refrig. Eng., vol. 9, no. 4, Oct. 1922, pp. 127–131 and (discussion) 131–132, 11 figs. Author makes following suggestions; (1) Extraction of heat through water and not through ice as means of manufacturing ice; (2) mechanical instead of air agitation. Ice-freezing system using supercooled water.

ICE PLANTS

Electrification. Advantages To Be Gained by Electrification of Ice Plants, W. H. Feldmann. Universal Engr., vol. 36, no. 5, Nov. 1922, pp. 22–26. Economic and operating advantages gained. Coal cost for steam and for producer-gas operation, and cost of electric service; increased output; saving in ammonia; etc.

Raw-Water, Electrically Driven. An Impressive Example of Progress in the Manufacture of Ice, Sidney Mornington. Compressed Air Mag., vol. 27, no. 12, Dec. 1922, pp. 347–350, 13 figs. Description of 60-ton electric-driven plant of City Ice Co., Easton, Pa., for raw-water ice production; compound compression for manufacture of ice alone.

IGNITION

Automobile. Ignition of Automobile Engines by Induction Coils (L'allumage des moteurs d'automobiles par bobines d'induction), L. Canaby. Arts et Métiers, vol. 75, no. 25, Oct. 1922, pp. 296–304, 22 figs. Advantages of magnetos; describes various types of coils.

Magnetos. New Splitdorf Magneto for Aircraft Engines. Aviation, vol. 13, no. 24, Dec. 11, 1922, p. 783, 2 figs. Description of ignition system specially developed for aircraft by Splitdorf Elec. Co.; made in two sizes, smaller one known as Model S and larger as Model SS.

INDUSTRIAL MANAGEMENT

Budget Control. Expense Control Through Budgeting, Park Mathewson. Indus. Management, vol. 64, nos. 4, 5 and 6, Oct., Nov. and Dec. 1922, pp. 202–206, 3 figs., 301–304, 1 fig. and 372–375, 2 figs. Oct.: Description of production, marketing and administrative budgets and sub-budgets. Nov.: Checking up record of accomplishment. Dec. Quota-budget summary.

Costs, Standardizing. Working Plans for Standard Costs, G. Charter Harrison. Management Eng., vol. 2, no. 6, June 1922, pp. 331–336, 2 figs.; and vol. 3, nos. 1, 2, 3, 4, 5 and 6, July, Aug., Sept., Oct., Nov. and Dec. 1922, pp. 5–10, 3 figs., 97–101, 1 fig., 161–166, 1 fig., 227–231, 1 fig., 289–294, 3 figs. and 353–357, 1 fig. June: How to determine machine rates. July: Compilation of standard cost of parts and assemblies. Aug.: Obtaining real value from cost system. Sept.: Use of formulas in determination and analysis of cost variations. Nov.: Charting cost variation data and controlling inventories. Dec.: Current costs and monthly profit and loss statement.

Engineering Department. The Successful Operation of an Engineering Department, W. E. Irish. Indus. Management (N. Y.), vol. 64, nos. 5 and 6, Nov. and Dec. 1922, pp. 265–270 and 329–334. Nov.: Engineering contacts with outside companies and purchased products or service. Dec.: What real selling means and how it affects purchasing.

Fluctuations in Industry and. The Broader Industrial Movements, Ernest S. Bradford. Management Eng., vol. 3, no. 6, Dec. 1922, pp. 327–332, 11 figs. How changes in demand for materials and products affect management.

Idleness and Waste Reduction. Relieving Industry of Burden, Wallace Clark. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 819–820. General plan for lifting burden of idleness and waste in manufacturing plants whose capacity, increased during the war and period immediately following, is in excess of present demands. Distributing overhead expenses by machine-rate method; keeping all equipment in use, even though it is necessary to reduce prices to secure orders; reducing manufacturing time; and lowering production costs.

Plant Maintenance. Organizing Plant Maintenance, M. W. Dundore. Iron Trade Rev., vol. 71, no. 24, Dec. 14, 1922, pp. 1625–1630, 4 figs. Typical maintenance organization required by average industrial plant is given as example.

Production Methods. The Advantages of Mass Production of Machinery Parts in General Machine Construction (Die Vorteile der Massenherstellung von Maschinenteilen gegenüber ihrer Einzelherstellung im allgemeinen Maschinenbau), Val. Litz. Werkstattstechnik, vol. 16, nos. 17, 19, 20 and 21, Sept. 1, Oct. 1, 15 and Nov. 1, 1922, pp. 493–500, 573–583, 618–624 and 641–646, 54 figs. Investigation as to how single-unit and small-quantity production of different sizes of product (steam stop valves) can be changed from single-unit into mass and series production in large machine shop for general machine construction.

Thrift in. Thrift in Industrial Materials, M. F. Simmons. Management Eng., vol. 3, no. 6, Dec. 1922, pp. 349–352. Discusses several phases of manufacturing and departmental operation. Salvaging industrial wastes; conservation of human labor. (Abstract.) Paper before Indus. Commission of State of New York.

Time Study. See TIME STUDY.

Improvement in. How Can Employee Relations Be Improved? Roy V. Wright. Ry. Age., vol. 73, no. 24, Dec. 9, 1922, pp. 1079–1081. Catechism that develops certain truths which must be recognized if conditions are to be bettered. Presented in discussion of paper read before Central Ry. Club, by F. W. Brazier.

INDUSTRIAL RELATIONS

Committee Meetings. Industrial Relations at Tennessee Copper Company, J. N. Houser. Min. & Metallurgy, no. 192, Dec. 1922, pp. 19–20. Meetings with committee of employees consisting of 40 or 50 men out of 700. Work of service department.

INTERCHANGEABLE MANUFACTURE

Quantity Production. Interchangeable Parts in Quantity Production (Les "pièces interchangeables" dans les fabrications en série), M. Garvin. Nature, no. 2531, Oct. 7, 1922, pp. 235–238, 5 figs. Tolerances; manufacture and application of gages.

INTERNAL-COMBUSTION ENGINES

Carburation. Carburation in Explosion Engines (Note sur la carburation dans les moteurs à explosion), D. Perrer. Arts et Métiers, vol. 75, no. 18, Mar. 1922, pp. 74–78, 6 figs. Discusses carburetors, atomizing, air injection, etc.

Combustion Velocity in. Velocity of Combustion of Working Mixtures in Internal-Combustion Engines, E. A. Chudacoff. Eng. Jl. (Russian), no. 1–3, Jan.-Mar. 1922, pp. 20–35, 18 figs. Theoretical and experimental data expressed in formular tables and curves.

Heavy-Oil Utilization. Some Factors Affecting the Utilization of Heavy Fuel Oils in Internal-Combustion Engines, Harold Moore. North-East Coast Instn. Engrs. & Shipbldrs., advance paper, no. 2378Q, for meeting Dec. 1, 1922, 10 pp., 7 figs. Deals with ignition difficulties; difficulties in burning oil after ignition has taken place; and difficulties caused by presence of comparatively small quantities of impurities.

[See also AIRPLANE ENGINES; AIRSHIPS, Engines; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; IGNITION; OIL ENGINES.]

IRON ALLOYS

Chromium-Iron. Duraloy, a New Heat-Resisting Metal. Automotive Industries, vol. 47, no. 24, Dec. 24, 1922, p. 1165. Alloy of chromium and iron developed by Cutler Steel Co. for various industrial uses; it is non-corrosive, retains good mechanical properties at high temperatures, and has great resistance to abrasion. See also Iron Age, vol. 110, no. 24, Dec. 14, 1922, p. 1567.

IRON, PIG

European. Foreign Pig Iron Generally Satisfactory, W. A. Barrows. Iron Age, vol. 110, no. 25, Dec. 21, 1022, pp. 1631–1632. Analyses of results obtained from employment of various grades of imported metal in American melting practice indicate uniformly successful application.

L

LABOR

Eight-Hour Law. The Eight-hour Law from the Practical Standpoint (La loi de 8 heures jugée par les faits), Paul Schlumberger. Société Industrielle de Mulhouse—Bul., vol. 88, no. 7, Sept. 1922, pp. 485–491. Discusses eight-hour law of Treaty of Versailles and French legislation based on it, and produces evidence against it. From Révue des Deux Mondes, Feb. 1, 1922.

Training. Labor Efficiency is in Direct Ratio to Fitness for the Work Given (La conservación y rendimiento del obrero estan en razón directa de la adaptación al trabajo que ejuceta), G. Sanchez Martin. Revista Minera, Metalurgica y de Ingenieria, vol. 73, no. 2857, Nov. 24, 1922, pp. 642–645. Training of labor, adaptability, muscular energy and its maintenance.

Twelve-Hour Shift. The Twelve-Hour Shift, Charles Wadsworth, 3d. Chem. & Met. Eng., vol. 27, no. 22, Nov. 29, 1922, pp. 1063–1067, 1 fig. Present status of problem; review of report of Federated Am. Eng. Societies on 12-hour shift in American industry.

LABOR TURNOVER

Calculation of. The Labor Turnover Chaos, J. D. Hackett. Management Eng., vol. 3, no. 6, Dec. 1922, pp. 347–348. Plea for system of accounting for flow of labor.

LATHES

Center. The Modern Centre Lathe, Louis Watkins-Machy. (Lond.), vol. 21, no. 530, Nov. 23, 1922, pp. 225–231, 15 figs. Post-war design of sliding, surfacing and screw-cutting lathes of John Lank & Son.

Turret. Using the Turret Lathe for Small Lots, Albert A. Dowd and Frank W. Curtis. Machy. (N. Y.), vol. 29, no. 4, Dec. 1922, pp. 266–270, 12 figs. Examples showing how small quantities of bar stock parts can be economically produced on turret lathe.

LIGHTING

Cotton Mills. Cotton Mill Lighting, James M. Metch. Illuminating Eng. Soc.—Trans., vol. 17, no. 8, Oct. 1922, pp. 577–599, 21 figs. Discusses number of standard group lighting designs which fill requirements for practically all cotton-mill processes.

LOADING BRIDGES

Types. Loading Bridges (Verladebrücken), Friedrich Riedig. Fördertechnik u. Frachtverkehr, vol. 15, no. 24, Nov. 24, 1922, pp. 307–312, 13 figs. Discusses general types; bridges with rotary traveling cranes; describes installations by MAN, Krupp, and others, comparing their efficiency.

LOCOMOTIVE BOILERS

Tubes. Methods of Fitting Locomotive Boiler Tubes, A. Wrench. Ry. Engr., vol. 43, no. 515, Dec. 1922, pp. 463–464, 12 figs. Discussion of several methods based on writer's practical experience.

LOCOMOTIVES

Consolidation-Type. The Consolidation Type for Both Freight and Passenger Service, George Bulkeley. Ry. Rev., vol. 71, no. 23, Dec. 2, 1922, pp. 779–783, 6 figs. Discussion as to whether consolidation-type locomotive can be further developed in competition with Pacific and Mikado locomotives.

Freight, Rating and Loading of. Effect on Ton-Mile Cost of Reducing Train Loads. Ry. Age, vol. 73, no. 25, Dec. 16, 1922, pp. 1145–1148. Illinois Central tests for U. S. R. A. show greatest economy with full-tonnage freight trains.

Pumping Engines
(See Engines, Pumping)

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoil-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
* Morris Machine Works.
Taber Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works.
* Worthington Pump & Machinery Corp'n

Pumps, Dry Vacuum
(See Pumps, Vacuum)

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Filter Press
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Hydraulic Press Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Hydraulic Press Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Pumps, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lunkenheimer Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Oil (Hand)
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Goulds Mfg. Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Morris Machine Works
* Smidth, F. L. & Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Morris Machine Works.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Punches, Metal Hand (Power)
* Parker-Kalon Corporation

Punches, Multiple
* Bliss, E. W. Co.
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Punches, Power
* Bliss, E. W. Co.
* Royersford Fdry. & Mch. Co.

Punches and Dies
* Bliss, E. W. Co.
* Royersford Fdry. & Mch. Co.

Punching and Coping Machines
Long & Allstatter Co.

Punching and Shearing Machines
* Bliss, E. W. Co.
Long & Allstatter Co.
* Royersford Fdry. & Mch. Co.

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Elliott Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Superheater Co.
Taylor Instrument Cos.

Pyrometers, Optical
Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co.

Pyrometers, Radiation
Taylor Instrument Cos.

Racks, Machine, Cut
* Brownell Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdy. & Mch. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Railways, Industrial
Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Refuse Destructors
(See Destructors, Refuse)

Regulators, Blower
* Davis, G. M. Regulator Co.

Regulators, Damper
* Kieley & Mueller (Inc.)
* Parker-Kalon Corporation

Regulators, Electric
* General Electric Co.

Regulators, Feed Water
Elliott Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
Equitable Meter Co.
* General Electric Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
Taylor Instrument Cos.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
Long & Allstatter Co.

Rivets (Steel, Brass & Copper)
* Reed & Prince Mfg. Co.

Roller Bearings
(See Bearings, Roller)

Rolling Doors and Shutters
(See Doors and Shutters, Steel or Wood, Rolling)

Rolling Mill Machinery
Mackintosh-Hemphill Co.

Rolls, Crushing
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Rolls, Rubber
Goodrich, B. F. Rubber Co.

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
* Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
* Johns-Manville (Inc.)

Rope Drives
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rubber Goods, Mechanical
Goodrich, B. F. Rubber Co.
* Jenkins Bros.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Water Intake (Traveling)
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Cap & Set
Allen Mfg. Co.
* Reed & Prince Mfg. Co.

Screws, Cap & Set (Steel)
* Reed & Prince Mfg. Co.

Screws, Drive (Hardened)
* Parker-Kalon Corporation

Screws, Machine (Steel and Brass)
* Reed & Prince Mfg. Co.

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker-Kalon Corporation

Screws, Wood (Steel, Brass and Bronze)
* Reed & Prince Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Mchy. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Co.

Manufacture, Spain. Locomotive Construction in Spain (Construcción de locomotoras en España), Vicente Burgaleta. Asociación de Ingenieros del Instituto Católico de Artes e Industrias—Anales, vol. 1, nos. 3 and 4, 1922, pp. 192–193 and 281–289, 2 figs. Suitable types of locomotives for Spain; tractive force and horsepower to be adopted; choice of boilers; necessary conditions for locomotive construction in Spain; importance of Spain's constructing its own locomotives.

Mountain Type. Most Powerful Passenger Locomotive in the World. Ry. & Locomotive Eng., vol. 35, no. 12, Dec. 1922, pp. 323–325, 6 figs. Description of new mountain type on Denver & Rio Grande Western R. R., built by Am. Locomotive Co., intended to handle passenger trains that have heretofore required two engines of other types. Length overall 95 ft.; driving wheel diameter 63 in.; boiler pressure per sq. in. 210 lb.; tractive effort 66,600 lb.

Power Reverse Gears. A New Construction in Locomotive Power Reverse Gears. Ry. Rev., vol. 71, no. 22, Nov. 25, 1922, pp. 743–746, 8 figs. Description and operation of All Service type, designed to eliminate creeping and respond to fine adjustment.

Shops, German. Germany's Great Locomotive Works. Godfrey L. Carden. Iron Age, vol. 110, no. 25, Dec. 21, 1922, pp. 1623–1624. Borsig organization and methods at Tegel, near Berlin; present difficulties.

Sleeve-Valve. Steam Distribution in the Locomotive. George H. Hartman. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 801–806, 6 figs. Particulars regarding new sleeve-valve arrangement for locomotives, designed by Charles J. Pilliod, that can be applied to old engines, either simple or compound; advantages. (Abridged.)

Steam-Turbine. The Ljungström Turbine Locomotive (Die Turbolokomotive von Ljungström), F. Meincke. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 46–47, Nov. 18, 1922, pp. 1060–1066, 33 figs. Design is based on maximum heat utilization without regard for customary locomotive design; consists of boiler car with combustion-air and feed-water heaters and condenser car with turbine and gearing. Coal consumption is about half that of superheater locomotives.

The Ljungström Turbine Locomotive (Locomotive à turbine, système Ljungström). Génie Civil, vol. 81, no. 20, Nov. 11, 1922, pp. 429–437, 31 figs. partly on supp. plate. Details of design of latest types, including reaction turbines, superheating, gear control, reversing mechanism and auxiliaries.

Stresses in Frames. Stresses in Locomotive Frames. R. Eksergian. Am. Soc. Mech. Engrs. advance paper for meeting Dec. 4–7, 1922, 146 pp., 41 figs. Preliminary analysis of major reactions brought on locomotive frame, nature of frame action as regards variation of bending moment, shear, etc., for differently supported types of frames; nature of lateral reactions and dynamics of lateral oscillations on entering curve.

Tank. New Baltic Tank Locomotives. Engineer, vol. 134, no. 3489, Nov. 10, 1922, p. 502, 3 figs. partly on supp. plate. Performance of locomotives employed on Glasgow & South-Western Ry.

Three-Cylinder. The 1 D 1 Three-Cylinder Passenger Locomotive, Class P 10 of the German State Railway (Die 1 D 1-Dreizylinder-Personenzuglokomotive Gattung P 10 der Reichsbahn), H. Fuchs. Glasers Annalen, vol. 91, nos. 9 and 10, Nov. 1 and 15, 1922, pp. 137–145 and 153–158, 43 figs. Details of most important parts and results of practical tests, which show that locomotives can develop a speed of from 45 to 110 km. per hr. and continuous cylinder output of 2000 hp.

LUBRICATING OILS

Dilution, Effect of. Effect of Dilution upon Viscosity and Oiliness of Lubricant, A. Ludlow Clayden. Automotive Industries, vol. 47, no. 21, Nov. 23, 1922, pp. 1023–1024, 2 figs. Points out that so far as bearings are concerned, a 300-sec. viscosity lubricant may be equally safe whether it is pure or diluted oil of heavier original body, but for piston lubrication, undiluted oil is vastly better.

Graphite in. Graphite in Lubricating Oils. Oil News, vol. 10, no. 22, Nov. 20, 1922, pp. 34–35. Best proportions of graphite and oil; how graphite aids lubrication; graphite in steam cylinders and marine engines.

Reclamation. Oil and Waste Reclaimed with Profit in Milwaukee. Elec. Ry. Jl., vol. 60, no. 21, Nov. 18, 1922, pp. 805–808, 6 figs. Describes apparatus and process employed by Milwaukee Elec. Ry. & Light Co. for reclamation of oil and waste used in motor, axle and journal housings of electric railway cars.

Testing. Lubricating Oils, Lubrication of Bearings and Friction Tests (Ueber Schmieröle, Lagerreibung und Reibungsversuche), H. Duffing. Zeit. fur angewandte Chemie, vol. 35, no. 84, Oct. 20, 1922, pp. 605–607, 6 figs. Discusses viscosity and other properties of lubricants, and design and application of oil-testing machines.

Viscosity. The Significance of Dependence of Viscosity on Temperature for Judging Oils (Die Bedeutung der Temperaturabhängigkeit der Viscosität für die Beurteilung von Ölen), Hans Vogel. Zeit. für angewandte Chemie, vol. 35, no. 82, Oct. 13, 1922, pp. 561–563, 4 figs. Lubricants and their properties; viscosimeters and determination of viscosity; the lubricating film and its temperatures.

LUBRICATION

Steam-Cylinder. Lubricating the Steam Engine Cylinder, R. A. Cultra. Power Plant Eng., vol. 26, no. 23, Dec. 1, 1922, pp. 1159–1161, 10 figs. Development of modern means and pointers on cars of hydrostatic lubricators and forced-feed pumps.

M

MACHINE-TOOL INDUSTRY

Problems. Problems of the Machine Tool Industry. Ernest F. Du Brul. Iron Age, vol. 110, no. 22, Nov. 30, 1922, pp. 1425–1430. Cooperation of dealer and manufacturer; cost factors; grinding-machine problems; etc. Address before Nat. Supply & Machy. Dealers' Assn.

MACHINE TOOLS

Special, for Gun Parts. Special Machines Found Economical. L. S. Love. Iron Age, vol. 110, no. 25, Dec. 21, 1922, pp. 1625–1626, 4 figs. Methods developed for handling gun parts; continuous milling machine and draw cut shaper built by Parker Bros.

MACHINERY

Construction-Cost Calculation. Net-Cost Calculation in Machine Construction (Die Arbeiten auf dem Gebiet der Selbstkostenberechnung im Maschinenbau). Maschinenbau, vol. 2, no. 1, Oct. 14, 1922, pp. WI-W4. Report of work of the Assn. of German Machine Builders.

Sound Detection. The Detection, Location and Comparison of Sound, C. E. Noël-Storr. Eng. Production, vol. 5, no. 110, Nov. 9, 1922, pp. 439–443, 9 figs. Construction and application of tectoscope and tectophone reproducers; electrical and recording systems. Paper presented before Instn. Production Engrs.

MARINE STEAM TURBINES

Reversing Gear. Epicyclic Reversing Gear for Ljungström Marine Turbines. Engineering, vol. 114, no. 2971, Dec. 8, 1922, pp. 699–703, 24 figs. Describes application of such gears to turbine-driven steamer of 2150 e.hp.

METAL CUTTING

Gas. City Gas Used as a Cutting Agent, D. R. Lane. Gas Age-Rec., vol. 50, no. 23, Dec. 2, 1922, pp. 757–758, 6 figs. Tests made on scrapped battleships; has many advantages over hydrogen and acetylene when mixed with oxygen; has an 1800-deg. flame.

METAL SPRAYING

Schoop Process. The Schoop Metal Sprayer (Den Schoopske metalsprøite), E. B. With. Ingeniören, vol. 31, no. 76–77, Nov. 4, 1922, pp. 469–471, 4 figs. Describes apparatus and its use for galvanizing.

METALS

Air-Cooling Curves. Characteristics of Air Cooling Curves. E. J. Janitzky. Am. Soc. for Steel Treating—Trans., vol. 3, no. 3, Dec. 1922, pp. 335–338, 3 figs. Observations on cooling curves in air (radiation, convection) and their characteristics.

Fatigue. Fatigue in Metals, C. F. Jenkin. Engineer, vol. 134, no. 3493, Dec. 8, 1922, pp. 612–614, 12 figs. Account of and experience with model made by author. Paper read before Roy. Aeronautical Soc.

Fluidity. Degree of Fluidity of Molten Metals (Der Flussigkeitsgrad geschmolzener Metalle). Giesserei-Zeitung, vol. 19, no. 44, Nov. 7, 1922, pp. 645–648, 5 figs. Testing degree of fluidity; viscosity and flow resistance of metals; relations between flow resistance and degree of overheating.

Structure. Structure of Metals and Alloys (L'Etude de la structure des métaux et alliages et ses conséquences), A. Portevin. France Belgique, vol. 11, no. 4, Oct. 1922, pp. 45–55, 9 figs. Heat treatment; micrography; making of slides; microstructure; crystals and grains; grain growth.

MILLING CUTTERS

Forged High-Speed. Advantages of the Forged Milling Cutter, William G. Calkins. Am. Soc. for Steel Treating—Trans., vol. 3, no. 2, Nov. 1922, pp. 239–244 and 251, 18 figs. Process of manufacture of high-speed steel with special reference to internal structural condition. Advantages of forged cutter as compared to cutter made direct from bar stock.

MILLING MACHINES

Index Heads. New Type of Universal Index Head (Un nouveau type de poupée-diviseur universel), P. Massot. Arts et Métiers, vol. 75, no. 25, Oct. 1922, pp. 291–296, 4 figs. Detailed description of type made by Philibert and Gambin; angular division; helicoidal milling.

Types. Modern Milling Practice. Eng. Production, vol. 5, no. 110, Nov. 9, 1922, pp. 434–437, 10 figs. Machines and equipment of Ingersoll Milling Machine Co., Rockford, Ill.

MOLDING METHODS

Molding Boxes. Jobbing Foundry Moulding Boxes, with Some Notes on Runners and Risers, C. Bickerton. Foundry Trade Jl., vol. 26, no. 328, Nov. 30, 1922, pp. 437–439 and (discussion) 439–440. Deals with heavier type of molding boxes usually fitted by mechanical power; notes on weighing machine girder box, troubles from pins, box handles, weighing boxes, lifting grids, castings, planing machine tables and machine cross slides, etc.

MOLDS

Drying. Mold-Drying Methods in Steel and Iron Foundries (Formtrockenmethoden in Stahl- und Eisengiessereien), H. Oehm. Giesserei-Zeitung, vol. 19, no. 45, Nov. 14, 1922, pp. 659–661. Disadvantages of methods heretofore employed; operation and practical results obtained with new type of drying apparatus developed by author.

MOTOR BUSES

Eight-Wheel. The Eight Wheel Automobile, D. A. Jacks. West. Machy. World, vol. 13, no. 11, Nov. 1922, pp. 391–392, 10 figs. Line of eight-wheel passenger busses, freight trucks and street cars designed and built by Nat. Axle Corp., San Francisco and San Jose, using Fageol patents for drive and axle construction.

MOTOR PLOWS

German. The German Motor-Plow Industry (Die deutsche Kraftpflugindustrie), W. Lehmann. Motorwagen, vol. 25, nos. 25 and 30, Sept. 10 and Oct. 31, 1922, pp. 471–481 and 572–579, 36 figs. Describes exhibits at the traveling exhibition of the German Agricultural Co., Nuremberg.

MOTOR TRUCKS

Albion. The New 30-cwt. Albion. Motor Transport, vol. 35, no. 925, Nov. 20, 1922, pp. 662–664, 6 figs. A pneumatic-tired chassis constructed mainly to recommendations of War Office M. T. Advisory Board.

Shefflex. The 30-Cwt. Shefflex Chassis. Automobile Engr., vol. 12, no. 169, Nov. 1922, pp. 322–328, 18 figs. Light commercial vehicle manufactured by Sheffield Simplex, Ltd., Sheffield; 4-cylinder engine driving through cone clutch to three-speed gear box, final drive being through overhead worm gear; 17–16 b.hp. at 800 r.p.m.

Transmissions. Some Applications of Electric Transmissions During the War (Quelques applications des transmissions électriques pendant la guerre), M. Duthil. Société Française des Électriciens—Bul., vol. 2, no. 17, July 1922, pp. 289–408, 8 figs. Applications to heavy vehicles, such as trucks, locomotives, etc., and advantages of electric transmission.

Types. Motor Trucks for Conveying Goods in Quantity (Neuere Lastkraftwagen fur die Beförderung von Massengutern), L. Ptaczowsky. Wirtschaftsmotor, no. 1, Jan. 25, 1922, pp. 7–12, 24 figs. Describes Krupp, Daimler, Adler and other types, with automatic loading, unloading and tipping arrangements.

N

NICKEL PLATING

Black-Nickeling. Black-Nickeling. Metal Industry (Lond.), vol. 21, no. 20, Nov. 17, 1922, pp. 457–458. Oxidizing processes; alkaline cyanide solutions; composition of black-nickel deposits; theory of black-nickeling; straight arsenic baths.

O

OFFICE MANAGEMENT

Routing and Control. Putting Office Work on a Production Basis, S. A. Peck. Indus. Management (N. Y.), vol. 64, no. 6, Dec. 1922, pp. 358–359, 3 figs. Routing and control in office administration.

OIL ENGINES

Agricultural. The Economical Use of Oil Engines in Farming (Zur Wirtschaftlichkeit des Oelmotors in der Landwirtschaft), F. Romberg. Motor u. Auto, vol. 19, no. 18–19, Oct. 15, 1922, pp. 244–250. Discusses use of oil engine on the farm for economical generation of power. Notes on choice of engine, fuel, etc.

Hopper-Type. 3-B.Hp. Hopper-Type Paraffin Engine. Engineering, vol. 114, no. 2971, Dec. 8, 1922, pp. 707–709, 11 figs. Small oil engine constructed by Drummond Bros., Ltd., Guildford, England, has cylinder 4 in. diam. by 6-in. stroke.

Marine. The Marine and Small Craft Exhibition. Engineering, vol. 114, no. 2969, Nov. 24, 1922, pp. 644–647, 11 figs. Describes two-stroke double-acting engines shown by Reed's Patent Engine Co., Southampton, one running on gasoline or paraffin, and other on crude oil; and two-stroke two-cylinder engine exhibited by Bruntons, Ltd., Sudbury; innovations in reverse gears; etc.

Solid-Injection. Compression Pressures in the Solid-Injection Engine. Power, vol. 56, no. 25, Dec. 19, 1922, pp. 980–982, 3 figs. Points out that Diesel engine requires compression pressure of 450 lb. per sq. in., whereas solid-injection engine uses only 300 to 350 lb. compression to cause ignition of fuel. Discusses reasons for this variation in compression requirements.

OIL FUEL

Burning Equipment. Oil and Oil Firing (Olie en oliestoken), A. Meijer. Ingenieur, vol. 37, no. 44, Nov. 4, 1922, pp. 886–893 and (discussion) 893–894, 19 figs. Oil resources available; oil-burning equipment, including various types of burners, furnaces and combustion chambers; regulating instrument.

The Colmar Burner, Walter H. Gardner. West. Machy. World, vol. 13, no. 11, Nov. 1922, p. 393. Kerosene burning system adapted to all heating, power and generating uses.

Coal vs. Comparing Value of Power Plant Fuels, G. Milton Levy. Power Plant Eng., vol. 26, no. 23, Dec. 1, 1922, pp. 1147–1148, 3 figs. Graphic method of computing cost of steam generated with oil and coal as fuel.

Economical Burning. Burning Fuel Oil Economically, Frank G. Parker. Power, vol. 56, no. 24, Dec. 12, 1922, pp. 940–941. Relation of furnace volume to heating surface; increasing life of furnace brick-

Shafting, Flexible
* Gwilliam Co.

Shafting, Turned and Polished
Cumberland Steel Co.
Link-Belt Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Sharpening Devices, Rock Drill
* Ingersoll-Rand Co.

Shears, Alligator
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Shears, Plate
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Shears, Squaring
* Bliss, E. W. Co.

Sheaves, Rope
Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheet Metal Working Machinery
* Bliss, E. W. Co.

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Sheets, Hard Rubber
Goodrich, B. F. Rubber Co.

Sheets, Rubber
Goodrich, B. F. Rubber Co.

Shelving, Metal
Manufacturing Equipment & Engrg. Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Sirens
(See Whistles, Steam)

Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Slitting Machines
* Bliss, E. W. Co.

Sluice Gates
(See Gates, Sluice)

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp, Wm & Sons Ship & Engine Bldg. Co.
DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
Lammert & Mann Co.
Mackintosh-Hemphill Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* Cleveland Worm & Gear Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Poole Engrg. & Mch. Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Spray Nozzles
(See Nozzles, Spray)

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Engines, Separators, Superheaters, Traps, Turbines, etc.
(See Engines, Separators, Superheaters, Traps, Turbines, etc., Steam)

Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Sarco Co. (Inc.)

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.

Steel, Cold Rolled
* Union Drawn Steel Co.
Cumberland Steel Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
* Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
* Keeler, E. Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Steering Engines
(See Engines, Steering)

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Stokers, Chain Grate
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
Green Engineering Co.

Stokers, Hand Operated
* McClave Brooks Co.

Stokers, Overfeed
* Detroit Stoker Co.
* McClave Brooks Co.
* Murphy Iron Works

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.

Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
Brinckerhoff, H. Gordon Co.
Heine Boiler Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.

Switches, Electric
* General Electric Co.

Synchroscopes
Weston Electrical Instrument Co.

Synchronous Converters
(See Converters, Synchronous)

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Tachometers
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Tachoscopes
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Tackle Blocks
(See Blocks, Tackle)

Tank Work (Air, Gas, Oil, Water)
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Tanks, Acid
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)

Tanks, Oil
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Hendrick Mfg. Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Brownell Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Machinery
* Franklin Machine Co.

Thermometers
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Thermometers, Distance
Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.

Thermostats
* Bristol Co.
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co. (Inc.)

Tie Tamping Outfits
* Ingersoll-Rand Co.

Time Controllers
(See Regulators, Time)

Time Recorders
* Bristol Co.

Tipples, Steel
Link-Belt Co.

Tongs, Crane
Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Machinists' Small
* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
DuPont Engineering Co.

Torches, Hand
* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Electric Crane & Hoist Co.
Whiting Corporation

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Illinois Engineering Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Illinois Engineering Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n

Trolleys, Monorail
Whiting Corporation

Tube Cleaners, Boiler
* Johns-Manville (Inc.)

Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.

Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
Goodrich, B. F. Rubber Co.

Tubing, Rubber (Hard)
Goodrich, B. F. Rubber Co.

Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mch. Co.
Whiting Corporation

work; absorption of heat in boiler; oil temperatures for mechanical and steam atomized burners; pumps and strainers.

OPEN-HEARTH FURNACES

Coke-Oven Gas Firing. Coke-Oven Gas for Open-Hearth Furnaces (Sur l'utilisation du gaz de fours à coke dans les fours Martin), Jean Dupuis. Revue de Métallurgie, vol. 19, no. 10, Oct. 1922, pp. 590–599. Its advantages for Martin furnace, temperature necessary, carbon deposit and its relation to quality of fuel.

Improvements. Open-Hearth Steel Practice, Willis McKee. Foundry, vol. 50, no. 24, Dec. 15, 1922, pp. 990–993, 5 figs. Water-cooled devices tend to stabilize furnace operations; flow-torch principle in parts gives more intimate mixture of gas and air and reduces melting time. Practice and improved furnace at plant of Brier Hill Steel Co. Paper presented before Am. Foundrymen's Assn.

Loftus Improved. Loftus Improved Open-hearth Furnace, William Millward. Min. & Metallurgy, no. 192, Dec. 1922, pp. 25–27, 3 figs. 75-ton open-hearth furnace burning producer gas equipped with new Loftus fuel and air devices demonstrates practicability of invention.

OXY-ACETYLENE WELDING

Burners. The Burner for Oxy-Acetylene Welding and Its Defects (Der Acetylen-Sauerstoffschweissbrenner und seine Fehler), Fr. Mangianelle. Acetylen, vol. 25, no. 9, 1922 (Autogene Metallbearbeitung), pp. 49–54. Discusses oxygen excess present with all burners which represents a loss and reduces quality of weld.

Locomotive Repairs. Application of Autogenous Welding in the Machine Shops of the North Railway Company (Applications de la soudure autogène dans les ateliers de machines du chemin de fer du Nord), M. Servonnet. Revue Générale des Chemins de Fer, vol. 41, no. 5, Nov. 1922, pp. 293–314, 37 figs. Application of acetylene welding to iron, steel, cast iron, repairing of fire tubes and cylinders, and of arc welding to cast iron and repairing of fireboxes, in locomotive repairing.

Plant. Oxy-Acetylene Welding and Cutting Plant. Eng. Production, vol. 5, no. 112, Nov. 23, 1922, pp. 485–489, 20 figs. Two examples of small plants with description of each of units which go to make up complete plant.

Safety in. Operating Oxyacetylene Apparatus, H. S. Smith. Iron Trade Rev., vol. 71, no. 23, Dec. 7, 1922, pp. 1557–1561. Safety obtained only by strict observance of rules governing care of equipment; acetylene generators require skilled operators; storage of carbide and tanks.

P

PAPER MANUFACTURE

Chlorine in. Chlorine in Paper Making, Ismar Ginsberg. Chem. Age (N. Y.), vol. 30, no. 11, Nov. 1922, pp. 487–488. Possibilities of chlorine process for manufacture of pure cellulose from wood and straw. Chlorine for paper making in Italy.

PAPER MILLS

Electric Drive. Applying the Electric Motor to the Pulp Industry, Gordon Fox. Power Plant Eng., vol. 26, no. 23, Dec. 1, 1922, pp. 1153–1156, 5 figs. Notes on pulp and paper-mill drives.

Application of the Electric Motor to Paper Making, Gordon Fox. Power Plant Eng., vol. 26, no. 24, Dec. 15, 1922, pp. 1209–1212, 4 figs. Intricate driving problems solved by development of sectional drive.

PATTERNS

Storage. Patternshop Organisation, James Edgar. Indus. Management (Lond.), vol. 8, no. 9, Nov. 16, 1922, pp. 282–284, 3 figs. Finishing and storing of patterns.

PEAT

Utilization. New Processes for Utilization of Peat (Neue Verfahren zur Torfverwertung und Torfveredelung), Joh. Steinert. Zeit. für angewandte Chemie, vol. 35, no. 81, Oct. 10, 1922, pp. 553–555. Peat as a fuel; water extraction; briquetting; etc. Shows that peat is a fuel well worth attention.

PISTON RINGS

Manufacture. The Manufacture of Piston Rings. Machy. (Lond.), vol. 21, no. 528, Nov. 9, 1922, pp. 161–164, 12 figs. Features in design and production of radially direct pressure rings. Also article on Making Over-size Piston Rings, pp. 165–166, 2 figs.

PISTONS

Machining. Economic Machining Methods and Devices for Engine Pistons (Wirtschaftliche Bearbeitung und Vorrichtungen für Motorkolben), J. Marretsch. Werkstattstechnik, vol. 16, no. 21, Nov. 1, 1922, pp. 637–640, 13 figs. Detailed description of entire machining process; holding, boring, milling and grinding devices of economic design.

PLANING

Accurate. No Hand Scraping on Planed Work, L. S. Love. Iron Age, vol. 11, no. 24, Dec. 14, 1922, pp. 1555–1557, 5 figs. Method of planing metal parts for exact fits without necessity of hand scraping; accuracy and long life secured with reduction in labor cost; special fixtures to hold strips for planing.

POWER PLANTS

Connecticut. Operating Features of the Montville Power Station. Power Plant Eng., vol. 26, no. 24, Dec. 15, 1922, pp. 1187–1192, 12 figs. Eastern Connecticut Power Co.'s plant is planned for ultimate capacity of 50,000 kw. but initial installation is 20,000 kw. Good results obtained during 3 years' operation.

Equipment. Glimpses of the Power Show. Power, vol. 56, no. 24, Dec. 12, 1922, pp. 928–936, 6 figs. Review of equipment; educational value of exhibits. List of exhibitors and their products.

Factory. Power for Making the Steinway Piano. Power Plant Eng., vol. 26, no. 23, Dec. 1, 1922, pp. 1139–1144, 10 figs. Describes power plant serving one of factories at Long Island City, N. Y. Details of boiler house, feedwater, kilns, exhaust steam, engine equipment and fire protection.

Germany. Present Tendencies in Electric Plant Construction in Germany (Tendances actuelles en matière de construction des grandes installations électriques en Allemagne), Henri Marchand. Industrie Electrique, vol. 31, no. 730, Nov. 25, 1922, pp. 425–432, 15 figs. Generators; static transformers; protection against short circuits; short-circuit-proof transformers; construction of transmission lines; protection of cables.

PRODUCER GAS

Moisture-Content Determination. The Determination of Moisture Content of Producer Gas (Die Bestimmung des Feuchtigkeitsgehaltes von Generatorgas), E. Maase. Feuerungstechnik, vol. 11, no. 3, Nov. 1, 1922, pp. 27–28, 2 figs. Describes apparatus constructed by Nagel for measurement of moisture based on determination of change in pressure which gas volume undergoes with cooling of temperature from above to below condensation point.

PULLEYS

Sizes and Types. Sizes and Types of Pulleys, Frank E. Gooding. Indus. Engr., vol. 80, no. 11, Nov. 1922, pp. 519–526, 22 figs. Practical pointers on pulleys for transmitting power through lineshafting to machines.

PULVERIZED COAL

Boiler Firing. How Powdered Coal Is Burned at Lakeside. Power, vol. 56, no. 25, Dec. 19, 1922, pp. 969–973, 5 figs. Details of conveyor system, burners and system of regulation; operating problems encountered and how they have been met.

Furnaces. Furnace Maintenance with Pulverized Fuel, Milton W. Arrowood. Iron Age, vol. 110, no. 25, Dec. 21, 1922, pp. 1633–1636, 5 figs. Effect of imperfect mixing in causing overheating of brick surfaces; abrasion of eddying currents; efficient firing and low maintenance.

Powdered Coal as Fuel in Steam Plants, Henry Kreisinger and John Blizard. Engrs.' Soc. West. Pa.—Proc., vol. 38, no. 5, June 1922, pp. 169–181 and (discussion) 182–200, 6 figs. Reasons for high thermal efficiency. Deals mainly with furnace design.

Malleable Iron Foundries. Powdered Coal for Malleable, T. W. Atterbury. Foundry, vol. 50, nos. 20 and 21, Oct. 15 and Nov. 1, 1922, pp. 815–819 and 880–884, 14 figs. Information based on practice at plant of T. H. Symington Co., Rochester, N. Y. Oct. 15: Experimental results indicate advantages of use of powdered fuel over hand firing. Nov. 1: Calculating gas velocity, volume and length of time in furnace; application to annealing ovens.

Pulverizers. Self-Contained Coal Dryer, Pulveriser and Blower. Power House, vol. 15, no. 22, Nov. 20, 1922, pp. 22–23, 3 figs. New machine, known as Atritor, dries, granulates; pulverizes to any degree of fineness and delivers fuel into combustion chamber all in one continuous process, at any desired rate of delivery without auxiliary plant other than feeding arrangement for coal.

Tests. Experiments on Coal Dust and Combustion of Pulverized Coal (Les expériences sur les poussières de houille et la combustion du charbon pulvérisé), Arnoul de Grey. Revue de Métallurgie, vol. 19, no. 11, Nov. 1922, pp. 645–665, 2 figs. Principles on which burners are constructed; chamber of combustion; possibility of using low-grade fuels.

PUMPS

Air-Lift. Raising Liquids by Means of Compressed Air (Elevación de liquidos por medio de aire comprimido), Antonio Gomez Remirez. Asociación de Ingenieros del Instituto Católico de Artes e Industrias—Anales, vol. 1, no. 4, 1922, pp. 290–296, 8 figs. Discusses air-lift pumping system, its advantages and application, and makes some calculations for plants.

Fire, Installation of. Some Points to Observe When Installing Fire Pumps, G. A. Van Brunt. Indus. Engr., vol. 80, no. 12, Dec. 1922, pp. 583–589, 17 figs. Outlines more important requirements of Nat. Board of Fire Underwriters governing installation of fire pumps.

Piston. Direct Operation and Upkeep of Piston Pumps for Conveying Water (Aufstellung, Betrieb und Unterhaltung der zum Fördern von Wasser benutzten Kolbenpumpen), Mitusch. Fördertechnik u. Frachtverkehr, vol. 15, no. 22, Oct. 27, 1922, pp. 283–285. Discusses suction and pressure lines, and gives details as to their construction and operation.

Reciprocating Displacement. Test Code for Reciprocating Displacement Pumps. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 844–847. Preliminary draft of eighth in series of 19 test codes being formulated by A.S.M.E. Committee on power test codes.

Types. Pumps, Ed. Cunningham. Domestic Eng., vol. 100, nos. 2, 3, 4, 8 and 13 and vol. 101, nos. 4 and 9, July 8, 15, 22, Aug. 19, Sept. 23, Oct. 28 and Dec. 2, 1922, pp. 48–51, 100–103, 139–142, 321–324 and 355, 536–539, 130–131 and 158–162, and 371–374, 31 figs. Development of apparatus of indispensible use to plumbing and heating contractor. Use of rotary pumps, which are particularly adaptable for pumping heavy liquids. Use of air-lift pumps.

PUMPS, CENTRIFUGAL

Piston and. Pumps (Les pompes). Métallurgie, vol. 53, no. 45, Nov. 9, 1922, pp. 1665–1668. Discusses work done by pumps and gives formulas and calculations; describes centrifugal and piston pumps, their operation and control.

R

RAILWAY ELECTRIFICATION

Arguments for. Some Arguments for Railroad Electrification, W. J. Davis, Jr. Gen Elec. Rev., vol. 25, no. 12, Dec. 1922, pp. 720–723. Discusses three necessary requirements of motive-power equipment capable of successfully meeting transportation requirements of the country, namely, (1) availability for service, (2) unrestricted power possibilities, and (3) economical operation. Comparison of steam service taken from records, and estimated electric service.

Chicago Terminals. Illinois Central Announces Plans for Chicago Terminals. Eng. News-Rec., vol. 89, no. 20, Nov. 16, 1922, pp. 841–843, 2 figs. Begins 18-year program of improvement on suburban and terminal electrification and lake-front park extension.

France. Electrification of the Midi System (L'électrification du réseau du Midi), L-D. Fourcault. Électricien, vol. 53, nos. 1312 and 1313, Nov. 15 and Dec. 1, 1922, pp. 505–513 and 529–534, 12 figs. Program of electrification; locomotive tests in France; locomotive construction and upkeep; workshops; describes double-bogie, 1400-hp. Midi-type locomotive; overhead transmission lines and equipment; substations; converters; etc.

Electrification of the National Systems (L'Electrification des réseaux nationaux), Auguste Pawlowski. Nature, no. 2535, Nov. 4, 1922, pp. 297–300, 4 figs. Design and operation of 1500-volt electric locomotives of Midi railway, and data on sections electrified.

Electrification Work of the Midi Railway (Les travaux d'électrification du réseau du Midi). Technique Moderne, vol. 14, no. 12, Nov. 15, 1922, pp. 485–490, 6 figs. Detailed description of 1400-hp. electric locomotive; line equipment and substations on Pau-Lourdes section; current protection; etc.

Partial Electrification of the System of the Orleans Railway Company (L'Electrification partielle du Réseau de la Compagnie des Chemins de Fer d'Orleans), H. Parodi. Houille Blanche, vol. 21, no. 69–70, Sept.-Oct. 1922, pp. 162–166, 2 figs. Describes work on section between Paris and Toulouse and gives some details of equipment.

Future of. The Future of Railway Electrification and Its Connection with Power Supply and Distribution, Philip Dawson. Elec. Rev., vol. 91, no. 2347, Nov. 17, 1922, pp. 742–745, 1 fig. Development on Continent of Europe, especially in Central Europe; British schemes.

Hydroelectric Development and. Hydro-Electric Power Development as Related to the Electrification of Railroads, C. F. Loweth. Am. Soc. Civ. Engrs.—Proc., vol. 48, no. 10, Dec. 1922, pp. 1872–1878. Conditions under which hydroelectric power would be important factor in steam-railway electrification.

Sydney, Australia. The Traffic Problem of Sydney, New South Wales, and Its Solution, J. J. C. Bradfield. Ry. Gaz., vol. 37, no. 21, Nov. 24, 1922, pp. 649–654, 14 figs. New loop lines to separate and extend urban railway facilities, electrification proposals, further extensions of railway system, and Sydney harbor bridge.

RAILWAY MANAGEMENT

Operating Departments. Reorganisation of Operating Departments, Great Indian Peninsula Railway. Ry. Gaz., vol. 37, no. 22, Dec. 1, 1922, pp. 714–717. In order to secure improved operating results and effect economy, coördination of running branches of traffic and locomotive departments under transportation department and formation of separate commercial and mechanical departments.

RAILWAY MOTOR CARS

Benzol. The Benzol Railway Motor Car of the N. A. G. (Der Benzoltriebwagen der N. A. G.), W. Kniehahn. Motorwagen, vol. 25, no. 29, Oct. 20, 1922, pp. 560–563, 6 figs. Details of car, gearing, and six-cylinder, 4-cycle engine. Car has been in successful operation on railway line for a year.

Electric. New Railway Motor Cars of the Burgdorf-Thun Railway (Switzerland) (Neue Motorwagen der Burgdorf-Thun-Bahn). Schweizerische Bauzeitung, vol. 80, no. 23, Dec. 2, 1922, pp. 255–257, 8 figs. New type consists of small locomotive and a passenger car, having front motor bogie in common, thus being shorter in length than such a combination ordinarily is, and traveling in both directions with changing bogie.

Gasoline. Novel Gasoline Motor for Railway Car Bodies, Raymond S. Zeitler. Ry. Rev., vol. 71, no. 25, Dec. 16, 1922, pp. 852–854, 2 figs. New design for self-propelled car utilized bolster as crankcase; double-end electropneumatic control.

Operating Cost. Railway Motor Cars (Motorvagnar för järnvägsdrift). Teknisk Tidskrift, vol. 52

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Ridgway Dynamo & Engine Co
* Terry Steam Turbine Co.

Turbo-Blowers
Brinckerhoff, H. Gordon Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Turbo-Compressors
* Ingersoll-Rand Co.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.

Turbo-Pumps
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

Turntables
Link-Belt Co.
Northern Engineering Works
Whiting Corporation

Underfeed Stokers
(See Stokers, Underfeed)

Unions
* Crane Co.
* Lunkenheimer Co.
* Vogt, Henry Machine Co.

Unions, Flange
* Hydraulic Press Mfg. Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Unloaders, Car
Link-Belt Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Goetze Gasket & Packing Co.
Goodrich, B. F. Rubber Co.
* Jenkins Bros
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Jenkins Bros.
* Smith, H. B. Co.

Valves, Air, Relief
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* Davis, G. M. Regulator Co.
* H.S.B.W.-Cochrane Corp'n
* Illinois Engineering Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
* Crane Co.
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Blow-off
* Ashton Valve Co.
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
Elliott Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Butterfly
* Crane Co.
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Check
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Electrically Operated
* Chapman Valve Mfg. Co.
* Dean, Payne (Ltd.)
* General Electric Co.
Kennedy Valve Mfg. Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Exhaust Relief
* Crane Co.
* Davis. G. M. Regulator Co.
* H.S.B.W.-Cochrane Corp'n
* Illinois Engineering Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.

Valves, Float
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Foot
* Crane Co.
* Worthington Pump & Machy. Corp'n

Valves, Gate
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Vogt, Henry Machine Co.

Valves, Hose
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Hydraulic
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Hydraulic Press Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Hydraulic Operating
* Hydraulic Press Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Davis, G. M. Regulator Co.
* Illinois Engineering Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Plug
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville (Inc.)

Valves, Radiator
* American Radiator Co.
* Crane Co.
* Dean, Payne (Ltd.)
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Radiator, Packless
* American Radiator Co.

Valves, Reducing
* Davis, G. M. Regulator Co.
Elliott Co.
* Kieley & Mueller (Inc.)

Valves, Regulating
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Illinois Engineering Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Stop & Check
(See Valves, Non-Return)

Valves, Superheated Steam (Steel)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Illinois Engineering Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Thermostatically Operated
* Dean, Payne (Ltd.)

Valves, Throttle
* Crane Co.
* Hooven, Owens, Rentschler Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Ventilating Systems
* American Blower Co.
Clarage Fan Co.

Vibration Indicating Machines
* Vibration Specialty Co.

Voltmeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Vulcanizers
* Bigelow Co

Wash Bowls
Manufacturing Equipment & Engrg. Co.

Washers, Rubber
Goodrich, B. F. Rubber Co.

Water Cinder Mills
(See Mills, Cinder, Water)

Water Circulators, Filters, Gages, Heaters, Meters, Strainers, etc.
(See Circulators, Filters, Gages, Heaters, Meters, Strainers, etc., Water)

Water Columns
* Ashton Valve Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Water Purifying Plants
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
Brinckerhoff, H. Gordon Co.
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Water Tube Boilers
(See Boilers, Water Tube)

Water Wheels
(See Turbines, Hydraulic)

Waterbacks, Furnace
Green Engineering Co.

Waterproofing Materials
* Johns-Manville (Inc.)
Texas Co.

Wattmeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Welding and Cutting Work
Linde Air Products Co.

Welding Equipment, Electric
* General Electric Co.

Wheels, Polishing Paper
Rockwood Mfg. Co.

Whistles, Steam
* Ashton Valve Co.
Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Winches
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.

Wire, All Metals
Driver-Harris Co.

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Flat
* Roebling's, John A. Sons Co.

Wire, Iron and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* General Electric Co.
* Roebling's, John A. Sons Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

Worm Gear Drives
* Cleveland Worm & Gear Co.
* Foote Bros. Gear & Mach. Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A., Fdy. & Mach. Co

Wrenches
*Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

no. 45, Nov. 11, 1922, pp. 716–720. Three replies to Prof. Hubendick's article published in Sept. 2, 1922, number, giving data on cost of operation of steam, gasoline and Diesel-electric cars.

RAILWAY REPAIR SHOPS

Reading, Pa. Locomotive Construction and Repair at Reading Shops. Boiler Maker, vol. 22, no. 11, Nov. 1922, pp. 315–317, 8 figs. Details of machine, blacksmith, boiler and erecting shop and features of boiler shopwork, of Philadelphia & Reading Ry.

Welding and Machining. Repair Work in a Tennessee Railroad Shop, S. Ashton Hand. Am. Mach., vol. 57, no. 22, Nov. 30, 1922, pp. 829–832, 15 figs. Arc welding; driving-box work; machining shoes and wedges; utilizing old asbestos insulation; inserting new pieces in broken frames.

RAILWAY TRACK

Tie-Tamping Machines. The Development of Tie-Tamping Machines (Die Entwicklung der Gleisstopfmaschinen), H. Ertz. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 46–47, Nov. 18, 1922, pp. 1067–1070, 11 figs. Older tamping machines of Jacobi and Collet; Hampke machines with electric motor, and improved electropneumatic arrangement; use of gasoline engines in place of electric motors; latest development with double two-stroke engine and double tamping tool.

RAILWAYS

American. What Is the Matter with the American Railroads Today? F. H. Alfred. Am. Soc. for Steel Treating—Trans., vol. 3, no. 2, Nov. 1922, pp. 175–184 and 238. Among causes for present condition, writer mentions over-regulation by Interstate Commerce Commission, through state commissions, and through Transportation or Cummins-Esch Act.

Poland. The Railways of Poland (Les Chemins de fer Polonais), M. Peschaud. Révue Générale des Chemins de Fer, vol. 41, no. 5, Nov. 1922, pp. 325–330, 1 fig. Discusses gages, rolling stock, operation and administration, traffic, rates, etc.

Rolling-Stock Material Specifications. Standardization of Specifications for Materials for Construction of Rolling Stock for the French Railways (Note sur les unifications des spécifications techniques pour la fourniture des matériaux entrant dans la construction des voitures, machines et tenders des grands reseaux de chemins de fer français), M. La Blant. Révue Générale des Chemins de Fer, vol. 41, no. 5, Nov. 1922, pp. 315–324. Standardization by Minister of Public Works of specifications of 1906 and 1917.

Steel-Work Construction Regulations. New Regulations for Steel Work Construction on the German Railways (Die neuen Vorschriften für Eisenbauwerke der deutschen Reichsbahn), Leopold Herzka. Eisenbau, vol. 13, nos. 9 and 10, Sept. 29 and Nov. 7, 1922, pp. 204–212 and 229–235, 4 figs. Details of symbols and designations for units of measurements and terminology in mechanics and statics. Discusses permanent and traffic loads, centrifugal force, temperature variations, wind pressure, tensile strength tests of steel bars, bridge material, etc.

REFRACTORIES

Carbonized Clay. A New Refractory Material, Walter Smith. West of Scotland Iron & Steel Inst.—Jl., vol. 30, part 1, session 1922–23, Oct. 1922, pp. 8–13 and (discussion) 13–15, 4 figs. on supp. plate. Points out marked difference which exists between admixture of carbon and clay, and structural change in clay itself after undergoing treatment by carbon-charged gases according to process.

Properties, Mechanical. Mechanical Properties of Refractories at High Temperature (Sur les propriétés mecaniques des produits réfractaires aux températures elevées), E.-L. Dupuy. Révue de Métallurgie, vol. 19, no. 11, Nov. 1922, pp. 672–675, 5 figs. Experiments to find crushing strength, showing critical points at 1000 and 1400 deg.; importance of time element in experiment.

REFRIGERANTS

Methyl Chloride and Butane. Low Pressure Refrigerants, H. D. Edwards. Refrig. World, vol. 57, no. 11, Nov. 1922, pp. 15–18. Considers low-pressure refrigerants with low boiling points; lubrication problem; fire hazard; vapor tension; possibility of butane and methyl chloride obtain important place in refrigeration practice outside of small unit. Paper read before Nat. Assn. of Practical Refrig. Engrs.

REFRIGERATION

Air Batteries. Air Batteries as Applied to Refrigeration in New Zealand Meat Works, W. G. Croll. Refrig. Eng., vol. 9, no. 5, Nov. 1922, pp. 158–159 and 162, 1 fig. Plants embody both wet and dry systems, former with brine, for egg and meat storage, and latter mostly for fruit storage.

REDUCTION GEARS

Single. Efficiency Test of Two 22,500 Hp. Single Reduction Gear Units by Method of Losses, H. G. Donald. Am. Soc. Nav. Engrs.—Jl., vol. 34, no. 4, Nov. 1922, pp. 497–526, 18 figs. Result of test of single reduction, double helical gear units conducted by Falk Co., Milwaukee, Wis., shows conclusively that 98½ per cent mechanical efficiency may be expected.

ROLLING MILLS

Brass. The New Works of the Hirsh Copper and Brass Co. (Das neue Werk der Hirsch Kupfer- und Messingwerke A.-G.), Georg Schlesinger. Zeit. des Vereines deutscher Ingenieure, vol. 66, nos. 40, 41 and 43–44, Oct. 7, 14 and 28, 1922, pp. 949–954, 969–972 and 1022–1024, 42 figs. Details of construction of a modernly equipped brass rolling mill; conveyance facilities; organization system, etc. See also Werkstattstechnik, vol. 16, nos. 20 and 21, Oct. 15 and Nov. 1, 1922, pp. 605–613 and 653–658, 42 figs.

Nickel and Monel Metal. Mills Built for Rolling Nickel and Monel. Blast Furnace & Steel Plant, vol. 10, no. 12, Dec. 1922, pp. 605–611, 7 figs. Describes refining process and new rolling mills at Huntington, W. Va. Physical properties of monel metal.

S

SAFETY

Work, Importance of. The Economic Importance of the Safety Movement, H. Weaver Mowery. Indus. Management (N. Y.), vol. 64, no. 6, Dec. 1922, pp. 355–357. Author shows that safety work, purely on basis of economic results, has proved itself to be necessary and increasingly important factor in industrial life.

Textile Code. Development of the Textile Safety Code Presents Many Intricate Problems, A. B. Cole. Safety Eng., vol. 44, no. 4–5, Oct.-Nov. 1922, pp. 165–169, 8 figs. Progress of preliminary activities outlined before Am. Soc. Safety Engrs.

SCREW THREADS

Standard Metric. The Adoption of the Metric Thread (Zur Einführung des metrischen Gewindes), H. Görsdorf. Telegraph- u. Fernsprech-Technik, vol. 11, no. 9, Sept. 1922, pp. 81–84, 1 fig. History of development leading to standardization by the German Industrial Standards Committee (NDI).

SEAPLANES

German Giant. Flying Boat and Pontoon Airplane (Flugboot und Schwimmerflugzeug), G. Maier. Motorwagen, vol. 25, no. 30, Oct. 31, 1922, pp. 581–583, 1 fig. With special consideration of the Dornier metal flying boats.

SHAFTS

Standardization. Report of the German Industrial Standards Committee (Normenausschuss der Deutschen Industrie). Maschinenbau, vol. 2, no. 1, Oct. 14, 1922, pp. N1-N8, 7 figs. Proposals of Board of Directors for standard hole and shaft allowances, for building materials, stresses in cast iron and steel, masonry of natural and artificial stone.

SHAPERS

Table Supports. Shaper Table Supports, Fred Horner. Machy. (Lond.), vol. 21, no. 529, Nov. 16, 1922, pp. 200–205, 17 figs. Devices employed by various manufacturers to counteract downward thrust of cut.

SLAG

Blast-Furnace. An Investigation of Losses in Copper Blast-Furnace Slag, D. F. Stedman. Eng. & Min. Jl.-Press, vol. 114, nos. 24 and 25, Dec. 9 and 16, 1922, pp. 1023–1027 and 1072–1076, 6 figs. Study of slags produced at plant of Consolidated Mining & Smelting Co., Trail, B. C., indicates some errors in work of earlier investigators; pyrogallic-acid method developed to determine amount of oxidized copper present.

STACKS

Dimensions, Determination of. Charts for Determining Stack Dimensions, R. A. Foresman. Power, vol. 56, no. 21, Nov. 21, 1922, pp. 804–806, 2 figs. Presents charts for determining height and diameter of stack.

STANDARDIZATION

Size. Size Standardization by Preferred Numbers, C. F. Hirschfeld and C. H. Berry. Mech. Eng., vol. 44, no. 12, Dec. 1922, pp. 791–800, 20 figs. Study of subject in connection with American conditions and problems. Authors develop preferred-number systems based on theory of geometrical series and apply them to various industries. Successful use of preferred numbers in Germany and other European countries.

STANDARDS

U. S. Bureau of. The National Bureau of Standards, R. S. McBride. Chem. & Met. Eng., vol. 27, no. 24, Dec. 13, 1922, pp. 1159–1164, 4 figs. Organization and functions, types of standards investigated, funds, personnel and methods; relation of industrial research and technical work to fundamental studies of constants and research in pure physics.

STEAM ACCUMULATORS

Ruths. The Importance of the Ruths Steam Accumulator for Mining Practice (Die Bedeutung des Ruths-Dampfspeichers für den Zechenbetrieb), P. Lüth. Glückauf, vol. 58, no. 45, Nov. 11, 1922, pp. 1341–1349, 6 figs. Advantages accruing from combining high-pressure steam with Ruths accumulator.

The Ruths Heat Accumulator (Der Wärmespeicher von Ruths), H. Gleichmann. Glückauf, vol. 58, no. 44, Nov. 4, 1922, pp. 1309–1318, 19 figs. Design and advantages of Ruths accumulator and its useful possibilities in mining, with special regard to improvement of existing plants.

STEAM-ELECTRIC PLANTS

Fuel Problems. The Fuel Element in Energy Production Costs, S. B. Flagg. Mech. Eng., vol. 44, no. 12, Dec. 1922, p. 818. Problems in rising fuel costs in connection with operation of steam-electric public-utility properties. (Abridged.)

STEAM ENGINES

Uniflow. A Uniflow Engine with an Unusual Valve Gear. Power, vol. 56, no. 22, Nov. 28, 1922, pp. 843–844, 4 figs. The Hamilton uniflow-engine valve gearing; method of setting valves in shop and field.

Correct Adjustment of Unaflow Engine Valve Gear. Power, vol. 56, no. 24, Dec. 12, 1922, pp. 942–943, 5 figs. Ridgway uniflow steam engine; auxiliary clearance device; how to time valves.

Setting Valves on the Nordberg Unaflow Engine. Power, vol. 56, no. 21, Nov. 21, 1922, pp. 800–801, 4 figs. Unusual features of valve design; auxiliary exhaust valves.

Unaflow Engines for Compressor Drive. Power, vol. 56, no. 25, Dec. 19, 1922, pp. 978–979, 4 figs. New Worthington uniflow engine compressor; governing device; method of setting steam valves.

STEAM GENERATION

High vs. Low-Pressure. High or Low Pressure for Steam Heater, Edgar Buckingham. Power House, vol. 15, no. 21, Nov. 5, 1922, pp. 21–22 and 24. Writer points out that by generating at high pressure and transmitting through small line, with large line drop, heat loss from line may be made much smaller than when pressure is low throughout system.

STEAM GENERATORS

Electric. New Type of Electric Steam Generator, E. M. Horstkotte. Power, vol. 56, no. 21, Nov. 21, 1922, pp. 795–797, 3 figs. Construction and operation of new type designed by Gen. Elec. Co. Economy of using electric boilers to absorb excess power from hydroelectric plants.

STEAM TRAPS

Development and Progress. Development and Progress in the Construction of Steam Separators (Entwicklung und Fortschritt im Bau von Kondenswasserableitern), Ph. Baab. Maschinenbau, vol. 2, no. 1, Oct. 14, 1922, pp. G8-G11, 17 figs. Discusses purpose, improvements and different types of steam traps.

STEAM TURBINES

Bleeder. The Bleeder Turbine as a Coal Conservator, J. L. Moore. Indus. Management (N. Y.), vol. 64, no. 6, Dec. 1922, pp. 360–363, 7 figs. Excess power as "by-product" of waste steam.

The Bleeder Turbine—Its History and Theory, J. L. Moore. Am. Soc. Heat. & Vent. Engrs.—Jl., vol. 28, no. 8, Nov. 1922, pp. 789–794, 7 figs. Design and operation.

Rotor Balancing. On the Balancing of Turbine Rotors, Kyoji Suyehiro. Soc. Mech. Engrs., Tokyo, Japan—Jl., vol. 25, no. 75, Sept. 1922, pp. 1–10, 9 figs. In author's method, magnitude and phase of both statical and dynamical unbalances are found directly at once, from all external disturbances.

Steam Velocity. The Influence of Shut-Off Devices on the Economical Steam Velocity of Superheated-Steam Turbines (Der Einfluss der Absperrorgane auf die wirtschaftliche Dampfgeschwindigkeit der Heissdampfturbinen), O. Denecke. Maschinenbau, vol. 2, no. 1, Oct. 14, 1922, pp. G1-G8, 2 figs. The top limits of economical steam-flow velocity; calculation of velocities.

Water-Rate Curves. Dividing Load Between Units, George R. Davison. Elec. World, vol. 80, no. 26, Dec. 23, 1922, pp. 1385–1387, 2 figs. Shows that it is necessary to plot total steam consumption of various combinations of turbines at different loads to establish operating schedules.

STEEL

Alloy. See ALLOY STEELS.

Aluminum in. Aluminum in Steel, W. H. Keen. Iron Age, vol. 110, no. 24, Dec. 14, 1922, p. 1574. Argument favoring its more liberal use; how not to use it.

Chrome-Nickel. See CHROME-NICKEL STEEL.

Corrosion. Effects of Steel Corrosion on Motor Car Bodies, C. O. Bannister. Automotive Manufacturer, vol. 64, no. 8, Nov. 1922, pp. 9–12 and (discussion) 12–14. Theory of corrosion, results of steel plates and effects of this upon finished motor-vehicle body; how it can be avoided. Paper read before British Carriage & Automobile Mfrs.

Fracture. Oblique Fracture and Flake Formation in Steel (Beitrag zur Kenntnis des Schieferbruches und der Flockenbildung im Stahle), F. Sommer and F. Rapatz. Stahl u. Eisen, vol. 42, no. 46, Nov. 16, 1922, pp. 1708–1712, 5 figs. Probable causes of both occurrences which are different from one another.

Numbering System. Movement to Designate Steel by Numbers. Iron Age, vol. 110, no. 24, Dec. 14, 1922, pp. 1569–1570. Investigation instituted under Government auspices by Eng. Standards Committee to have numbering system for tool and other steels.

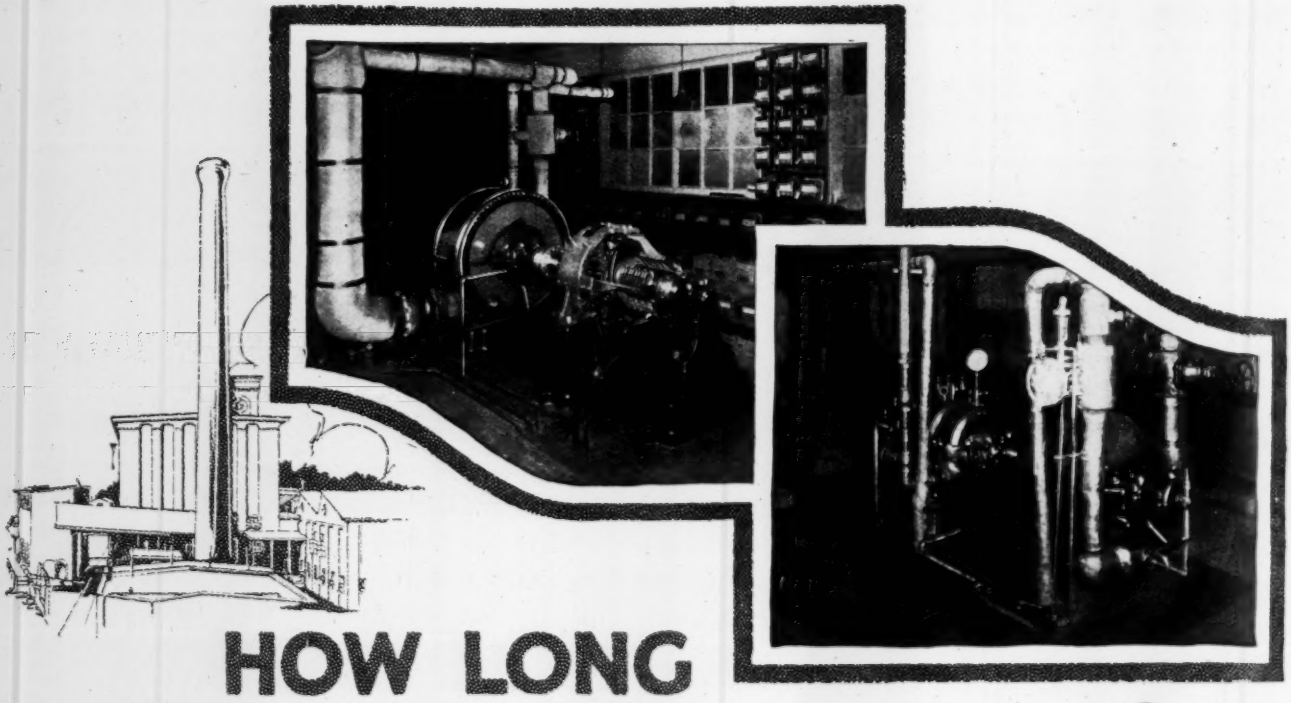
STEEL CASTINGS

Defects in Working Material. The Testing of Workshop Material in Steel Castings (Einige Betrachtungen über die Werkstoffprüfung bei Stahlformguss), R. Krieger. Stahl u. Eisen, vol. 42, no. 48, Nov. 30, 1922, pp. 1769–1773, 1 fig. Defects in samples taken from cast-steel pieces and their causes.

Facing Sand. Studies Changes in Grain Size, R. L. Doty. Foundry, vol. 50, no. 24, Dec. 15, 1922, pp. 987–989 and 996, 5 figs. Extended tests show fineness of silica sand not increased by additions of fire-clay, but clay builds up on grains of sand enlarging them; results of sieve test. Paper presented before Am. Foundrymen's Assn.

STEEL, HEAT TREATMENT OF

Crucible Furnaces. Heat Treatment of Steel in



HOW LONG SHOULD A TURBINE LAST?

WHILE the life of any piece of mechanical equipment depends to a large extent on the care and attention it receives, its potential life depends upon materials and design. The illustration at the top shows a Terry Lighting Set installed in 1911 at the plant of Joseph Benn Sons, Inc. There were no shutdowns or repairs until it was overhauled in 1921 when the glands, bearings and wheel were replaced.

The Terry Boiler Feed Unit illustrated at the right was installed in 1912, a new wheel was all that was necessary when it was overhauled in 1921. By replacing these worn parts they have practically restored the turbines to their original condition. Dividing the cost of these repairs by the number of years in operation shows an exceptionally low upkeep cost per year, thus it is possible to prolong the life of the Terry Turbine indefinitely by replacing the few wearing parts. This is an important item to bear in mind when considering the first cost of your Steam Turbine.

Bulletin A-25 describes in detail the wearing parts and shows their accessible arrangement in the Turbine. Write for it and you can easily see you are making a permanent investment when you buy

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Crucible Furnaces. Can. Machy., vol. 28, no. 19, Nov. 9, 1922, pp. 20–21. Uniform heat of first importance; pressed-steel pots said to give good service; handling parts in quantities; preventing formation of scale.

Hardening. Practice on Quenching Mediums for Hardening. Can. Machy., vol. 28, no. 20, Nov. 16, 1922, pp. 28–29. Oil is said to give best proportions between hardness, toughness and warpage; care should be taken to keep water out of bath; brine and acid for extreme hardness.

Salt Baths for. Salt Baths for Heat Treating, Sam Tour. Am. Soc. for Steel Treating—Trans., vol. 3, no. 2, Nov. 1922, pp. 245–251. Covers work done by writer up to present time. Summarizes requirements which proper salt bath should meet.

STEEL MANUFACTURE

Crucible Steel. Comparison of American and English Methods of Producing High Grade Crucible Steel, T. Holland Nelson. Am. Soc. for Steel Treating—Trans., vol. 3, no. 3, Dec. 1922, pp. 279–298, 24 figs. American method is said to differ in three great essentials from English, namely, source of heat, furnace itself, and crucible pot; comparison of American gas-fired with Sheffield coke-hole crucible furnace.

Early History, England. Early History of Steel Making in England, Rhys Jenkins. Engineer, vol. 134, no. 3492, Dec. 1, 1922, pp. 572–574. Review of early works. Paper read before Newcomen Soc.

Temperature, Influence of. Influence of Temperature in the Manufacture of Steel (Influence de la température dans la fabrication de l'acier), Ch. Clausel de Coussergues. Revue de Métallurgie, vol. 19, no. 11, Nov. 1922, pp. 639–644. Discusses temperature at all stages of the melt, and temperature measurement.

STEEL WORKS

Auxiliary Drives. Steel Mill Auxiliary Drives, L. A. Umansky. Gen. Elec. Rev., vol. 25, nos. 10 and 11, Oct. and Nov. 1922, pp. 611–617 and 699–710, 22 figs. General factors affecting selection of electric motors for auxiliary drives. Explains method of calculating performance of motor-driven reversing mill table, including friction, acceleration, duty cycle, plugging, and influence of gear ratios.

Electric Tool Steel. Layout for Electric Tool Steel Plant, Merle W. Caruthers. Iron Age, vol. 110, no. 21, Nov. 23, 1922, pp. 1363–1364, 1 fig. Arrangement of buildings and equipment, particularly melting department; storage of scrap and ferroalloy.

Electrical Developments. Electrical Developments in Iron and Steel Works. Elecn. vol. 89, no. 2323, Nov. 24, 1922, pp. 586–593, 12 figs. Part I, by James Smith. Review of recent developments, dealing specially with lifting and handling appliances; details of modern cranes, magnets, shunting locomotives, charging and stripping machines, etc. Part II, by L. Rothera. Rolling mill drives and accessories.

England. Development at the Works of the North-Eastern Steel Co., Middlesbrough. Iron & Coal Trades Rev., vol. 105, no. 2856, Nov. 24, 1922, pp. 761–764, 12 figs. Work and installations in connection with abandoning Bessemer basic in favor of open-hearth process. Details of reheating furnaces, 5-ton ingot stripper, slag-grinding plant, dust-collecting plant, ore gantry, etc.

STOKERS

Development. Chronological History of Stoker Development, A. H. Blackburn. Power, vol. 56, no. 23, Dec. 5, 1922, pp. 898–899. Developments in stokers from first Jukes patent in 1838 up to present day. Notes on underfeed single- and multiple-retort, underfeed lateral-retort, overfeed inclined-grate, and traveling- and chain-grate stokers. See (discussion) in no. 24, Dec. 12, pp. 911–912. Paper read before Am. Soc. Mech. Engrs.

STRIKES

Causes. Why Men Strike, Edward A. Filene. Indus. Management (N. Y.), vol. 64, no. 6, Dec. 1922, pp. 376–380. Remedy that lies in making business a profession. The rights of employees.

STRUCTURAL STEEL

Repeated Stresses. Repeated Stress Failures of Construction Steel and their Relation to the Krupp Repeated Impact Test, F. Rittenhausen and F. P. Fischer. Forging & Heat Treating, vol. 8, no. 11, Nov. 1922, pp. 519–525, 22 figs. Explains nature of repeated stresses and origin of fractures, in case of number of fractures which occurred in service; results of 3500 single tests on Krupp repeated impact machine, relation between resistance of steel to repeated stresses and its elastic limit is shown; danger of sharp notch forms; case-hardened machine parts subjected to repeated stresses have longer life. Translated from Stahl u. Eisen, Nov. 24, 1921.

STUFFING BOXES

Patent Specifications. Stuffing-Boxes and Substitutes Therefor (including Packing Therefor). Abridgements of Specifications, class 122 (v), period 1909–15, 1922, 115 pp. Patents for inventions.

T

TANKS, MILITARY

Amphibious. Amphibious Tank, Novel Engineering Development, Swims Hudson River. Automotive Industries, vol. 47, no. 24, Dec. 14, 1922, pp. 1164–1165, 3 figs. Body rests on six wheels when out of water; steering gear locked when crawler is used and steering accomplished by running one truck faster than other; screw propellers for water operation; engine-piston displacement is 665 cu. in.

TAPS

Standard. Commercial Standards As Adopted by the Tap and Die Institute. Am. Mach., vol. 57, no. 23, Dec. 7, 1922, pp. 883–890. Twelve tables are presented.

TERMINALS, RAILWAY

Freight. Freight Stations and Their Modern Organization (Les gares à marchandises et leur organisation rationnelle et moderne), Auguste Pawlowski. Nature, no. 2534, Oct. 28, 1922, pp. 278–282, 5 figs. Discusses systematizing of traffic, operation of arrivals and departures, and gives examples of New York Central, Dunkirk and Bordeaux stations.

TEXTILE MACHINERY

Cotton Opening and Carding. Cotton Opening, Mixing and Carding Machinery, H. Wilkinson. Engineer, vol. 134, no. 3491, Nov. 24, 1922, pp. 550–551, 5 figs. Describes various machines employed, including hopper bale breaker, opener and feeder, Crighton opener cylinder, dust trucks, scutchers, carding engine, etc. (Abstract.) Paper read before Instn. Mech. Engs.

Manufacture. The Manufacture of Textile Machinery. Machy. (Lond.), vol. 21, nos. 529 and 531, Nov. 16 and 30, 1922, pp. 193–197, 22 figs., and 257–261, 11 figs. Nov. 16: Methods employed by Dobson & Barlow, Ltd., Bolton, England. Operations in manufacture of rollers; taker-in roller. Nov. 30: Machining carding engine flats; milling practice on textile-machinery components.

THERMODYNAMICS

Low-Temperature Phenomena. The Behavior of Substances at Low Temperatures in Relation to the New Theories of Nernst and Planck. (Das Verhalten von Stoffen bei tiefen Temperaturen im Zusammenhang mit den neuen Theorien von Nernst und Planck), H. Schmolke. Wärme, vol. 45, no. 40, Oct. 13, 1922, pp. 483–486, 2 figs. It is shown that phenomena observed at low temperatures can be explained by the quantum theory and afford confirmation of the Nernst theory.

Second Law. Thermodynamics and the New Physical Theories, N. V. Cashin. Eng. Jl. (Russian), no. 1–3, Jan.–Mar. 1922, pp. 3–9. General discussion of the subject dealing with modern theories, particularly those of Boltzmann on the second law of thermodynamics and entropy. (In Russian.)

TIDAL POWER

Utilization. Utilization of Tidal Power (Sur l'utilisation de l'énergie des marées), A. Defour. Revue Générale de l'Électricité, vol. 12, no. 18, Nov. 4, 1922, pp. 673–685, 5 figs. Average power obtainable in course of a year at Saint Malo, and reservoirs, turbines and pumps necessary for a successful installation.

TIME STUDY

Percentage Estimation. Do Time Studies Tell All the Truth? Harry K. Reed. Management Eng., vol. 3, no. 6, Dec. 1922, pp. 359–362. Study of various factors which make percentage necessary in effort to obtain intelligent basis for estimating percentage.

Training Men for. Training Time-Study Men, Stewart M. Lowry. Indus. Management (N. Y.), vol. 64, no. 6, Dec. 1922, pp. 356–371, 2 figs. System of training evolved by Westinghouse Elec. & Mfg. Co. Avoiding "hit-or-miss" in rate setting by educational methods.

TIRES, RUBBER

Rolling Resistance. Power Losses in Pneumatic Tires (Zur Frage der Kraftverluste bei Luftreifen), O. Enoch. Motorwagen, vol. 25, no. 28, Oct. 10, 1922, pp. 529–531, 3 figs. Reply to paper in Jl. of Soc. Automotive Engrs., giving measurement results of rolling resistance of cord and fabric tires which Prof. Lockwood, the author, claims are in disagreement with tests made in writer's laboratory and other German tests.

TOOLS

Distance Pieces. Manufacturing Distance Pieces, A. Wilford. Eng. Production, vol. 5, no. 109, Nov. 2, 1922, pp. 411–413, 3 figs. Describes production in four operations of distance piece manufactured from seamless steel tubing.

TRACTORS

Caterpillar. The Caterpillar Tractor in Agriculture (Der Raupenschlepper in der Landwirtschaft), Albert Neuburger. Wirtschaftsmotor, no. 1, Jan. 25, 1922, pp. 25–27, 7 figs. Application to plowing, reaping and other operations, and its construction.

TROLLEY BUSES

Double-Trolley. The Double-Trolley Bus (L'Omnibus à double trolley), M. Peridier. Société Française des Électriciens—Bul., vol. 2, no. 17, July 1922, pp. 379–388, 5 figs. Describes Paris types, having a positive and negative wire; details of chassis; wiring diagram.

Types. The Trolley Bus (Les autobus électriques à trolley, dits "trolleybus"), M. Iglésis. Société Française des Électriciens—Bul., vol. 2, no. 17, July 1922, pp. 339–378, 28 figs. Difference of cost of various systems of traction; field of usefulness of trolley bus; describes systems of various countries.

TUBES

Copper. Cold Drawing of. Drawing Plant for Copper Tubing, Richard Hänchen. Eng. Progress, vol. 3, no. 12, Dec. 1922, pp. 267–269, 4 figs., partly on p. 270. General application of draw benches; modern drawing plant for copper pipe of large Czechoslovakian metal company; double draw bench of 1.5 tons pull; draw bench of 50 tons pull.

V

VENTILATION

Air Ducts. The Design of Air Ducts, Charles L. Hubbard. Domestic Eng., vol. 101, no. 8, Nov. 25, 1922, pp. 322–324, 1 fig. Methods of determining size of main ducts and branches.

Closed-Air-Circuit System. Closed Air Circuit System of Ventilation, John G. Monson. Gen. Elec. Rev., vol. 25, no. 12, Dec. 1922, pp. 750–754, 1 fig. New system of ventilation which is claimed to be superior in many respects to duct system.

N. Y. State Commission Report. Outline of Report of New York State Commission on Ventilation, D. D. Kimball. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 28, no. 8, Nov. 1922, pp. 809–812. Objects of investigations; general conclusions reached; field work done; recommendations.

VIBRATION

Marine Reduction Gearing. Notes on Torsional Oscillations with Special Reference to Marine Reduction Gearing, A. T. Thorne and J. Calderwood. North-East Coast Instn. Engrs. & Shipbldrs., advance paper, no. 2347Q, for meeting Nov. 17, 1922, 20 pp., 19 figs. Results of investigation directed towards obtaining confirmation or otherwise by direct observation of natural frequencies calculated and determining magnitude and character of vibrations actually experienced.

Reproducing Device. New Device Permits Studying Motion of High Speed Machine Parts. Automotive Industries, vol. 47, no. 23, Dec. 7, 1922, pp. 1132–1133, 1 fig. Device known as Elverson oscilloscope developed in England is based on principle of persistence of image of object produced by momentary flash of light. Gives reproduction of movement at speed reduction of 100 to 1, or stationary image of part in any point in cycle of operation.

W

WAGES

Systems. The Regulation of Wage Contracts (Tarifliche Regelung des Akkordwesens), P. Schmerse. Stahl u. Eisen, vol. 42, no. 45, Nov. 9, 1922, pp. 1677–1686, 6 figs. Experiences with the Rhenish-Westphalian wage system. Recommendation for a general German wage system, based on hour-work rather than piece-work rates.

Premium Systems. The Premium System in Office Departments, F. E. Barth. Indus. Management (N. Y.), vol. 65, no. 1, Jan. 1923, pp. 49–56, 4 figs. Describes establishment and operation of system of payment as actually applied to clerical force of a few-score employees.

WEIGHTS AND MEASURES

Length, Standardization of. National and Universal Standardization of Length Measurement (Normalisation nationale et normalisation universelle. La loi des longeurs industrielles), F. Bayle. Genie Civil, vol. 81, no. 21, Nov. 18, 1922, pp. 461–464, 1 fig. Discusses metric and other lengths and proposes universal system of measurement.

WELDING

See AUTOGENOUS WELDING; ELECTRIC WELDING, ARC; OXY-ACETYLENE WELDING.

WIND MOTORS

Electricity Supply by. Electricity Supply By Means of Wind Motors and Storage Batteries (Elektrizitätsversorgung durch Windmotoren und Akkumulatoren), P. M. Grempe. Elektrotechnischer Anzeiger, vol. 39, nos. 176, and 177, Nov. 4 and 7, 1922, pp. 1384–1387 and 1396–1397, 3 figs. Describes erection and operation of wind motors in rural districts for supply of electric light and power and water supply.

WIND TUNNELS

Torsion Balance for. Aerodynamic Torsion Balance in the Turin Aeronautical Laboratory (Bilancia aerodinamica di torsione presso il Laboratorio di Aeronautica del R. Politecnico di Torino), Carlo Luigi Ricci. Ingegneria, vol. 1, no. 5, Nov. 1, 1922, pp. 121–126, 9 figs. partly on supp. plate. Wind tunnel experiments and its equipment and instruments, including torsion balance.

WIRE ROPE

Torsion of Alternating. The Alternating Torsion of Rope-Wire, Ellice M. Horsburgh. Engineering, vol. 114, no. 2973, Dec. 22, 1922, pp. 759–760, 6 figs. Comparison of various grades and sizes of rope wire, under alternating stresses from point of view of resistance to fatigue.

WOODWORKING MACHINES

Sawdust-Collecting Plant. Sawdust and Shavings Collecting Plant. Engineering, vol. 114, no. 2967, Nov. 10, 1922, p. 596, 1 fig. Plant for collecting shavings and sawdust from woodworking machines situated in shops spread over very large area.

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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

THE ENGINEERING INDEX

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THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

Photoprint copies (white printing on a black background) of any of the articles listed in the Index may be obtained at a price of 25 cents a page. When ordering photoprints identify the article by quoting from the Index item: (1) Title of article; (2) Name of periodical in which it appeared; (3) Volume, number, and date of publication of periodical; (4) Page numbers. A remittance of 25 cents a page should accompany the order. Orders should be sent to the Engineering Societies Library, 29 West 39th Street, New York.

(See also page 214 of this issue for supplementary items.)

ABRASIVE WHEELS

Polishing Wheels. Polishing Wheels. Bradford H. Divine. Machy. (N. Y.), vol. 29, no. 5, Jan. 1923, pp. 372–375, 6 figs. Manufacture of compress polishing wheels.

ACCIDENTS

Temperature as Related to. Industrial Accidents in Relation to Temperature. H. M. Vernon. Indus. Management (Lond.), vol. 8, no. 12, Dec. 28, 1922, pp. 371–372, 1 fig. Determination of best temperature for accident prevention. Results obtained at two munition factories show that it is open to many employers to contribute towards elimination of accidents. (Abstract.) Report no. 19 of Indus. Fatigue Research Board.

ACETYLENE

Generators. A New Acetylene Generator on the Immersion System (Ein neuer Acetylenentwickler des Eintauch-Systems). Acetylen, vol. 25, nos. 8 and 9, Aug. and Sept. 1922, pp. 43–46 and 49–51, 6 figs. Describes apparatus made by Weberwerke Co. for containers with a capacity of 90, 125, 180 and 350 liter for 2, 4, 6 and 10 kg. of carbide.

AERODYNAMICS

Model and Full-Scale Testing. The Co-relation of Model and Full Scale Work. R. McKinnon Wood. Aeronautical Jl., vol. 26, no. 144, Dec. 1922, pp. 480–497 and (discussion) 497–501, 10 figs. Factors in relation between wind-tunnel and full-scale tests; use of model tests; theories.

AIR COMPRESSORS

Diesel-Engine. Calculating Injection Air Compressors for Diesel Engines (Die Bemessung des Einspritzluftkompressors einer Dieselmaschine). Arthur Balogh. Fördertechnik u. Frachtverkehr, vol. 15, no. 26, Dec. 22, 1922, pp. 327–332, 9 figs. Describes new method for finding size of compressor, giving examples and calculations.

Lubrication. Efficient Lubrication of Air Compressor. Power House, vol. 15, no. 24, Dec. 20, 1922, pp. 25 and 28. Destructive nature of carbon deposit; affects proper operation of valves; danger of vapor ignition; cleaning compressor and piping system.

Lubrication of Air Compressors (Le graissage des compresseurs d'air), René Pérot. Génie Civil, vol. 81, no. 25, Dec. 16, 1922, pp. 569–570, 4 figs. Discusses lubricating films, its qualities, temperature, etc.

Types. Some Elements of Economy in Air Compression. Wm. Carter. Power House, vol. 15, no. 23, Dec. 5, 1922, pp. 24–26. Steam-driven air compressors of single and compound types; electrically driven machines; methods of lubrication and governing; cooling by water jacket and intercoolers; types of valves, etc.

AIR CONDITIONING

Tests. Relation of Temperature, Humidity and Circulation in Air Conditioning. James Mackay. Domestic Eng., vol. 101, no. 12, Dec. 23, 1922, pp. 523–527, 7 figs. Results of tests conducted in schools and industrial buildings. Gives psychrometric table, embracing usual ranges of dry-bulb temperatures in heating and ventilating work, with wet-bulb up to 100 per cent humidity.

AIRCRAFT CONSTRUCTION MATERIALS

Steels. Special Steels and Airplane Construction (Les aciers spéciaux et la construction des aéroplanes). Usine, vol. 31, no. 49, Dec. 9, 1922, pp. 21–29, 6 figs. Discusses special metals produced by Jacob Holtzer Co., their composition, and mechanical and chemical properties.

Wing Coverings. Effect of Climate on Standard Airplane-Wing Coverings. Air Service Information Circular, vol. 4, no. 384, Nov. 1, 1922, 11 pp., 4 figs. Experiments to determine relative suitability of various doping schemes, using standard doping materials, in different climates.

AIRPLANE ENGINES

Development. The problem of the Airplane Engine (Le problème du moteur d'aviation). J. Ville. Revue Générale des Sciences, vol. 33, no. 2, Jan. 30, 1922, pp. 48–55. Effect of continually increasing altitudes; density of air; coefficient of compression; adaptation of explosion engine to airplanes, its safety of operation.

Farman. The Farman Airplane Engine (Le Moteur d'aviation Farman), Henri Petit. Technique Automobile et Aérienne, vol. 13, no. 119, 1922, pp. 97–106, 18 figs. Details of construction and operation; weight 820 kg.; 600 to 800 hp., 1750 to 2200 r.p.m.

Fuels, Doped. The Effect of Doped Fuels on the Fuel System—II. Air Service Information Circular, vol. 4, no. 383, Nov. 1, 1922, 3 pp., 1 fig. Investigation for purpose of giving a more complete idea of corrosive effect of various doped fuels on materials used or proposed for use in fuel systems.

AIRPLANE PROPELLERS

Blades, Vibration of. The Vibration of Airscrew Blades, J. Morris. Aeronautical Jl., vol. 26, no. 144, Dec. 1922, pp. 472–475, 3 figs. Calculations.

Characteristics. The Prediction of Propeller Characteristics from the Blade Element Analysis, William H. Miller. Aerial Age, vol. 15, nos. 19 and 21, Oct. and Dec. 1922, pp. 500–502, and 590–592, and 598, 8 figs. Résumé of propeller theory. Simple method of approximating characteristics of airscrew over working range.

Paragon Adjustable and Reversible. The Paragon Adjustable and Reversible Propeller. Aviation, vol. 14, no. 1, Jan. 1, 1923, p. 19, 1 fig. Change from full speed ahead to reverse made in 3 sec. See also Flight, vol. 14, no. 45, Nov. 9, 1922, pp. 657–658, 3 figs.

AIRPLANES

Aerofoils. Aeromarine High Efficiency Wing Curve, Paul G. Zimmermann. Aviation, vol. 14, no. 1, Jan. 1, 1923, p. 12, 1 fig. As applied to U. S. Model WM mail airplane.

Damping Coefficients Due to Tail Surfaces in Aircraft, Lynn Chu. Nat. Advisory Committee for Aeronautics, Report no. 136, 1922, 14 pp., 7 figs. Experiments to compare damping coefficients of aerofoil as calculated from knowledge of static characteristics of section with those obtained experimentally with oscillator. Results were such as to encourage continued use of conventional method of calculation.

Commercial. "Sattco" Six-Passenger Commercial Airplane. Aviation, vol. 13, no. 25, Dec. 18, 1922, p. 808, 1 fig. New Liberty-engined cabin biplane. Dimensions: Span, 43 ft. 6 in.; height, 11 ft. 10¾ in.; length, 30 ft. 2 in.; weight empty, 2711 lb., loaded, 3790 lb.; max. speed, 125.7 mi. per hr.

Commercial Use. Commercial Use of Airplanes. Edward P. Warner. Boston Soc. Civ. Engrs.—Jl., vol. 9, no. 10, Dec. 1922, pp. 285–301, 11 figs. Present position of aerial transport in Europe and America and problems met with by those seeking to use airplane for commercial purposes.

Construction. Present Tendencies in Airplane Construction (Tendances actuelles de la construction des avions), P. Grimault. Aéronautique, vol. 4, no. 43, Dec. 1922, pp. 387–394, 7 figs. Discusses materials, including wood, duralumin, steel, extra-light metals; framework; fuselage.

Control, Monoplane. New Monoplane Control Proves Successful. Aerial Age, vol. 16, no. 1, Jan. 1923, pp. 20–21, 2 figs. New invention by Grover Loening, called lateral "pressure equalizer" is mounted on extreme tip of each wing. Tests proved successful.

Dewoitine. The Dewoitine Monoplane (L'avion monoplan Dewoitine). Aérophile, vol. 30, no. 21–22, Nov. 1–15, 1922, pp. 332–334, 7 figs. 300-hp. Hispano engine; carries total load of 420 kg.; speed 260 km.p.h.; altitude 8500 to 9000 m.; all metal.

Fighters. The Dornier "Falke" Fighter. Aeroplane, vol. 23, no. 24, Dec. 13, 1922, pp. 451–452, 8 figs. Single-seat cantilever monoplane of combined steel and duralumin construction, fitted with 340-hp. Wright, Hispano type, engine, and equipped with two machine guns.

Flying Boats. See FLYING BOATS.

Great Britain 1922. Aeronautics in 1922. Engineer, vol. 135, no. 3497, Jan. 7, 1923, pp. 10–12, 11 figs. partly on supp. plates. Details of more interesting machines produced by British firms.

Helicopters. See HELICOPTERS.

Landing Stations. Boston Airport, R. C. Moffat. Boston Soc. Civ. Engrs.—Jl., vol. 9, no. 10, Dec. 1922, pp. 303–308, 2 figs. General arrangement of landing field and approaches.

Maintenance and Operating Equipment of Airplane and Seaplane Stations, Archibald Black. Aerial Age, vol. 16, no. 1, Jan. 1923, pp. 15–19 and 40, 11 figs. Types of equipment for general maintenance of stations, for their operation and servicing of aircraft, with approximate costs.

Metal Construction. The Case for Metal Construction, John D. North. Roy. Aeronautical Soc.—Jl., vol. 27, no. 145, Jan. 1923, pp. 3–17 and (discussion) 18–25, 5 figs. Advantages claimed are (1) retrenchment of weight, (2) improvement in reliability of materials, (3) longer life, (4) better resistance to adverse climatical conditions, (5) improvement in bulk manufacturing facilities, and (6) reduction in some risks and effects of fire.

Parachutes. See PARACHUTES.

Speed Timing. The Timing of Airplane Speeds, Edward P. Warner. Aviation, vol. 14, no. 1, Jan. 1, 1923, pp. 16–17. Discusses methods of timing and calculating speed from time.

Sport. Swanson Model 3 Sport Plane. Aviation, vol. 13, no. 26, Dec. 25, 1922, p. 837, 2 figs. Small single-seater fitted with Lawrance engine.

The Airplane and the Amateur Builder, Lester D. Seymour. Aviation, vol. 13, no. 26, Dec. 25, 1922, pp. 831–836, 3 figs. Compendium of elementary notions and formulas for building small single-seater sport plane.

Stresses. Analysis of Stresses in German Airplanes, Wilhelm Hoff. Nat. Advisory Committee for Aero-

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician(Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 132

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Mchy. Corp'n

Aerial Tramways
(See Tramways, Wire Rope)

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Alternators
(See Generators, Electric)

Ammeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Ammonia Condensers, Fittings, etc.
(See Condensers, Fittings, etc., Ammonia)

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Boiler
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Baffle Walls, Boiler
Brinckerhoff, H. Gordon Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Balanced Draft Systems
Brinckerhoff, H. Gordon Co.

Balancing Machines
* Vibration Specialty Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Norma Co. of America
* Royersford Fdy. & Mch. Co.
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Chain Link
(See Chain Belts and Links)

Belting, Conveyor
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Endless
Goodrich, B. F. Rubber Co.

Belting, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller-Bearing Co.

Binder (Lenix)
* Smidth, F. L. & Co.

Bleaching Machinery
Philadelphia Drying Machinery Co.

Blocks, Tackle
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Blowers, Centrifugal
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Forge
Clarage Fan Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blowers, Steam (Ring Type)
* McClave Brooks Co.

Blowers, Turbine
Brinckerhoff, H. Gordon Co.
* Kerr Turbine Co.

Blueing
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Compounds
(See Compounds, Boiler)

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, Etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Murray Iron Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Heine Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* Murray Iron Works Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien John Boiler Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Heine Boiler Co.
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
Heine Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Bolts, Stove (Steel)
* Reed & Prince Mfg. Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brewers' and Bottlers' Machinery
* Vilter Mfg. Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
Brinckerhoff, H. Gordon Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.

Bridgewalls (Furnace)
McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.
Todd Shipyards Corp'n

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Burrs (Steel, Brass & Copper)
* Reed & Prince Mfg. Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equipment & Engrg. Co.

Cable Railways
(See Railways, Cable)

Cable Wire
(See Rope, Wire)

Cables, Electrical
(See Wire & Cables, Electrical)

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

nautics, Report no. 143, 1922, 52 pp., 52 figs. Aerodynamics principles and their use in determining strength of airplanes; other considerations; analysis of strength qualities of construction materials; calculated strength and strength tests; conversion formulas of A. Betz; classification of military airplanes; calculation for wing spars. Bibliography.

Torpedo. England Builds Giant Torpedo Plane. Aerial Age, vol. 16, no. 1, Jan. 1923, pp. 21–22. Naval aircraft of torpedo type being built by Supermarine Works for Air Ministry.

U. S. Mail Dh-M2. Performance Test of U. S. Mail DH-M2. Air Service Information Circular, vol. 4, no. 386, Nov. 1, 1922, 5 pp., 5 figs. Summary of results; distribution of weights; pilot's observations, description of airplane and power plant.

Weight of Parts. Estimation of Weight of Aeroplane Parts, Edward P. Warner. Roy. Aeronautical Soc. Jl., vol. 27, no. 145, Jan. 1923, pp. 26–34, 5 figs. Major assemblies which make up airplane structure are discussed in turn, and each assembly dissected and analysis made of laws governing weights of components.

AIRSHIPS

Lighter-than-Air. Development of the Lighter-than-Air Airship, Edward Schildhauer. Boston Soc. Civ. Engrs.—Jl., vol. 9, no. 10, Dec. 1922, pp. 269–284, 5 figs. Development in Germany and England; aerial development in America; design and location of airport.

ALCOHOL

Molasses as Source. A Report on the Manufacture of Industrial Alcohol from Hawaiian Molasses, W. L. McCleery and H. P. Agee. La. Planter & Sugar Mfr., vol. 69, nos. 25, 26 and 27, Dec. 16, 23 and 30, 1922, pp. 449–450, 468–470 and 487–490. Report of Committee on Manufacture of Sugar and Utilization of By-Products to Hawaiian Sugar Planters' Assn.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Bearing Metals. See BEARING METALS.

Binary. Solidification of. Cored Crystals and Metallic Compounds, Edgar C. Pain. Chem. & Met. Eng., vol. 28, no. 2, Jan. 10, 1923, pp. 65–69, 6 figs. Each cored dendrite contains many small crystals with similar lattices but slightly different in composition and dimension; intermetallic compounds usually have complex lattices giving little opportunity for slip; hence are brittle.

Bronzes. See BRONZES.

Carbonless. Some Considerations in Connection with "Carbonless" Alloys, J. Kent Smith. Metal Industry (Lond.), vol. 21, no. 26, Dec. 29, 1922, pp. 597–598. Use of manganese question of solubility.

Cobalt-Tungsten. Cobalt Tungsten Alloys, Karl Kreitz. Metal Industry (N. Y.), vol. 20, no. 12, Dec. 1922, pp. 463–464, 1 fig. Some physical, chemical and electrical properties of this mixture. Abstracted from Metal u. Erz, Mar. 22, 1922, pp. 137–140.

Copper. See COPPER ALLOYS.

Iron. See IRON ALLOYS.

Non-Ferrous. The Wrought Nonferrous Alloys in 1922, W. H. Bassett. Jl. Indus. & Chem., Eng. vol. 15, no. 1, Jan. 1923, pp. 31–32. Notes on copper alloys; improvements in quality; electric melting of alloys; corrosion.

ALUMINUM ALLOYS

Aluminum Bronze. Casting of Aluminum Bronze, Charles Vickers. Foundry, vol. 50, no. 23, Dec. 1, 1922, pp. 958–960, 4 figs. Method of gating peculiar to this class of casting must prevent lathering of metal; horn gates used with large end toward casting; heaving risers needed to feed shrinkage.

Methods of Making Aluminum Bronze Castings. Air Service Information Circular, vol. 4, no. 376, Oct. 15, 1922, 16 pp., 21 figs. Investigation to determine mechanical properties and casting qualities of several compositions with varying iron and aluminum content; and to obtain experience in foundry so as to be prepared to make castings of these alloys.

Preparation of Light Aluminum-Copper Casting Alloys, R. J. Anderson. U. S. Bur. of Mines, Tech. Paper, no. 287, 1922, 44 pp., 21 figs. Principles involved; methods employed in preparing light and rich alloys; experiments. Bibliography.

ARTILLERY

Caterpillar Adapters. Summary of Tests of Caterpillar Adapters for the G. P. F., L. A. Miller. Coast Artillery Jl., vol. 57, no. 6, Dec. 1922, pp. 523–528, 1 fig. Results of service test to determine tactical efficiency of material equipped with caterpillar adapters in fulfilling mission of army artillery; to compare tactical efficiency of adapter mount with that of tractor-drawn wheel mount; and to determine whether use is of sufficient advantage to warrant converting all 155-mm. gun material into this type in case of war.

AUTOMOBILE ENGINES

Assembling. Assembling, Testing and Storing Motors, Fred H. Colvin. Am. Mach., vol. 57, no. 26, Dec. 28, 1922, pp. 981–983, 9 figs. Methods employed by Peerless Motor Car Co. in handling its engines.

Carburetors. See CARBURETORS.

Connecting Rods. See CONNECTING RODS.

Cylinders. See CYLINDERS, Founding.

Ignition. See IGNITION.

Midwest. Midwest Adds to Line of Passenger Car Engines. Automotive Industries, vol. 47, no. 26, Dec. 28, 1922, p. 1269, 2 figs. New six has displacement of 268.4 cu. in. and develops 70 hp. at 3000 r.p.m.

New York Show. Engine Design Shows Service Influence, A. Ludlow Clayden. Automotive Industries, vol. 48, no. 2, Jan. 11, 1923, pp. 69–71, 7 figs. Features of design at New York show.

Waukesha. High Fuel Economy Obtained in New Waukesha Engine, P. M. Heldt. Automotive Industries, vol. 47, no. 26, Dec. 28, 1922, pp. 1270–1273, 5 figs. 110 ton-miles per gal. of gasoline shown in tests; features include aluminum-alloy pistons, Ricardo-type combustion head, high compression, valve rotators, and radiated bearings; experimental data.

AUTOMOBILE FUELS

Types. Motor Fuels in France (Etude de la question des carburants en France), A. Grebel. Génie Civil, vol. 81, nos. 24 and 25, Dec. 9 and 16, 1922, pp. 537–541 and 558–563, 3 figs. Comparative value of different motor fuels and liquid fuels; their calorific power; alcohols from beet sugar, molasses and grain tabulation of fuels produced from mineral and vegetable material.

AUTOMOBILES

A. C. Six-Cylinder. A Two-Litre "Six." Autocar, vol. 49, no. 1415, Dec. 1, 1922, pp. 1140–1141, 2 figs. Test of A. C. car with modern type six-cylinder engine. Acceleration, speed and tractability on top gear are marked features.

Belsize-Bradshaw. The Belsize-Bradshaw Four-Seater. Autocar, vol. 49, no. 1416, Dec. 8, 1922, pp. 1191–1193, 5 figs. 9-hp. two-cylinder oil-cooled engine; describes steering and sprinving, gear changing and other details.

Bodies. Body Production System Combines Progressive and Group Methods, J. Edward Schipper. Automotive Industries, vol. 47, no. 25, Dec. 21, 1922, pp. 1221–1224, 11 figs. Methods of production of Oakland 644 roadster and coupe bodies; work is passed along a line wherever possible, but efficiency of individual operations is always considered.

Rise of Service Coupes and Sport Models a Feature of Show, George J. Mercer. Automotive Industries, vol. 48, no. 2, Jan. 11, 1923, pp. 77–82, 21 figs. Use of fabric in body construction gains converts; closed bodies show great similarity of line; standard phaetons and roadsters few in number.

Bugatti. The Eight-Cylindered Bugatti. Auto-Motor Jl., vol. 27, no. 49, Dec. 7, 1922, pp. 1049–1050, 6 figs. 17.8-hp. two-liter model; horizontal Zenith carburetors; single high-tension magneto with variable firing point for ignition; lubrication of engine by pressure.

Chassis Design. Durability and Silence Stressed in Chassis Design, P. M. Heldt. Automotive Industries, vol. 48, no. 2, Jan. 11, 1923, pp. 64–69, 18 figs. Survey of chassis at New York show. Single-plate clutch gains in popularity; efforts made to better brakes; tendency away from unit power plants; anti-rattle features on springs; accessibility improved.

Chevrolet Copper-Cooled. Chevrolet Copper-Cooled Car Ready for Market, J. Edward Schipper. Automotive Industries, vol. 47, no. 26, Dec. 28, 1922, pp. 1259–1265, 10 figs. New line, developed at Gen. Motors Research Laboratory, embodies advanced ideas in cooling; copper radiating fins welded to cylinder barrel; four cylinders cast separately.

Constructive Suggestions. Engineering Practice Leaves Much to be Accomplished, Henry M. Crane and Herbert Chase. Automotive Industries, vol. 48, no. 2, Jan. 11, 1923, pp. 61–63, 3 figs. Constructive suggestions based on critical survey of New York show. It is claimed that much can still be done toward making engine and chassis parts more accessible, improving brakes, steering gears and control connections.

Courier. New Courier Line Comprises Nine Body Types, J. Edward Schipper. Automotive Industries, vol. 47, no. 25, Dec. 21, 1922, pp. 1234–1235, 1 fig. Wheelbase of 116 in. used for all models; automatic chassis lubricating system employed.

Kegresse-Hinstin. The Kegresse-Hinstin Cars for the Sahara Expedition. Engineering, vol. 115, no. 2975, Jan. 5, 1923, p. 13, 6 figs. Details of Citroen motor cars being used in attempted journey across desert.

Lighting. Report of Committee on Motor Vehicle Lighting 1921–1922. Illuminating Eng. Soc.—Trans., vol. 18, no. 1, Jan. 1923, pp. 29–32 and (discussion) 32–35. Revised specifications; rear-lamp specifications; standard colors of traffic signals.

New York Show. New Chassis Models Shown by Thirteen Makers, J. Edward Schipper. Automotive Industries, vol. 48, no. 2, Jan. 11, 1923, pp. 53–60, 18 figs. New models exhibited at New York show.

Parts. Newly Developed Parts Make Appearance at Show, P. M. Heldt. Automotive Industries, vol. 48, no. 2, Jan. 11, 1923, pp. 72–76, 6 figs. Units of all descriptions cover entire automotive field; new features shown.

Peugeot. The New 12 Hp. Peugeot. Auto-Motor Jl., vol. 27, no. 49, Dec. 7, 1922, pp. 1047–1049, 10 figs. Transmission is by long propeller shaft in torque tube; overhead valve engine of monobloc construction.

R. & V. Four-Bearing Knight Six Powers New R. & V. Model. Automotive Industries, vol. 48, no. 1, Jan. 4, 1923, pp. 13–15, 3 figs. Features include new and exceedingly rigid frame and long springs, rear ends of which are carried on swivels with inclined fore and aft axes intended to minimize frame twist; V-type radiator abandoned.

Resistance to Translation. Resistance to the Translation of Motor Vehicles, T. R. Agg. Iowa State College of Agriculture & Mechanic Arts Official Publication, Bul. no. 64, vol. 20, no. 53, May 31, 1922, 32 pp., 18 figs. Deals with abortive attempts to measure so-called tractive resistance and describes methods finally adopted. Results seem to show that rolling resistance is about half of total resistance to translation when vehicle with good tires is operated on hard, smooth road surfaces, and resistance due to impact is very small on such surfaces.

Sedan Body. Steel Tubing Used for Framework of New Sedan Body. Automotive Industries, vol. 48, no. 1, Jan. 4, 1923, pp. 4–6, 6 figs. Sliding doors, aluminum panels and loose seats feature new British design; "square front" causes step at back end of cowl.

Steering Systems. A Critical Study of Modern Steering System Design, Herbert Chase. Automotive Industries, vol. 47, nos. 25 and 26, Dec. 21 and 28, 1922, pp. 1225–1232 and 1276–1280, 16 figs. Dec. 21: Center-point arrangement of knuckle pivots has many European advocates but is little used in United States; caster angle of about 2 deg. generally employed; causes of hard steering; reasons for undergather and foregather. Dec. 28: Causes of wheel wobble; reduction in steering-gear mechanisms vary from 6 to 1 to about 10 to 1.

Tops. Problems of the All-Weather Top. Autocar, vol. 49, no. 1416, Dec. 8, 1922, pp. 1181–1186, 19 figs. Difficulties encountered by designers, such as cost, weight, ease of handling, durability, rigidity, adaptability, transparency and lighting, etc., and means adopted to overcome them.

Vulcan. The 12 Hp. Vulcan Chassis. Automobile Engr., vol. 12, no. 171, Dec. 1922, pp. 386–392, 13 figs. Detailed description of medium-weight light car of conventional design; Dorman K. N. O.-type engine.

AVIATION

Altitude Indicators, Night. An Optical Altitude Indicator for Night Landing, John A. C. Warner. Nat. Advisory Committee for Aeronautics, Tech. Notes, no. 123, Jan. 1923, 5 pp., 3 figs. Details of Jenkins night altitude indicator. German types similar in principle.

Naval. Admiral Moffet's Report on Naval Aviation. Aviation, vol. 13, no. 25, Dec. 18, 1922, pp. 800–804, 2 figs. Summary of year's progress from July 1, 1921, to June 30, 1922, gives comprehensive outline of organization.

B

BEARING METALS

Babbitt, Microstructure of. The Micro-Structure of Babbitt Metal, R. W. Irwin and A. McArthur Johnston. S. African Instn. Engrs. Jl., vol. 21, no. 5, Dec. 1922, pp. 82–84, 8 figs. Authors' reply to discussion.

BEARINGS

Anti-Friction. Anti-Friction Bearings for Electric Cars, Oscar R. Wikander. Elec. Ry. Jl., vol. 60, no. 25, Dec. 16, 1922, pp. 935–940, 15 figs. Review of results obtained from use of anti-friction bearings in United State: and abroad, with description of some of principal types: economies effected and troubles experienced.

Lubrication. Bearings and Their Lubrication (I sopporti e la loro lubrificazione). Elettrotecnica, vol. 9, no. 29, Oct. 15, 1922, pp. 698–700. Discusses manual and forced-feed lubrication for journal, ball, roller, and other bearings; choice and tests of lubricants.

Oil Flow in Ring-lubricated Bearings, A. Fisher. Machy. (Lond.), vol. 21, no. 532, Dec. 7, 1922, pp. 311–312, 9 figs. Results of author's experiments compared with experiments on high-speed bearings made by O. Lasche in 1903.

BEARINGS, BALL

Ball Manufacture. Making Steel Balls, A. L. De Leeuw. Am. Mach., vol. 57, nos. 25, and 26, Dec. 21, and 28, 1922, pp. 945–948, and 985–988, 15 figs. Methods used by Atlas Ball Co. to produce steel balls.

Developments. How Ball Bearings Can Reduce Transmission Costs, R. C. Hawkes. Can. Machy., vol. 29, no. 1, Jan. 4, 1923, pp. 17–19, 4 figs. Development of ball bearings for lineshafting and savings effected: various types of drives.

Roller and. Ball- and Roller-Bearings, with Particular Reference to Mining Work, R. Allan. Instn. Min. Engrs.—Trans., vol. 64, part 2, Nov. 1922, pp. 50–68, 14 figs. Underlying principles of ball and roller bearings, and possibilities of their application to coal mines.

Elimination of Power Losses in Mines by the Use of Ball- and Roller-Bearings, Kenelm C. Appleyard and A. W. Macaulay. Iron & Coal Trades Rev., vol. 105, no. 2859, Dec. 15, 1922, p. 888. (Abstract.) Paper read before North of England Inst. Min. & Mech. Engrs.

BELT DRIVE

Transmission Losses. Belt Transmission (Note sur les transmissions par courroies), G. Genkin. Revue Générale de l'Electricité, vol. 12, no. 25, Dec. 23, 1922, pp. 975–988, 8 figs. Calculation of various transmission losses; optimum speed and tension; life of belts; etc.

BLAST FURNACES

Progress 1922. Ironmaking Progresses in 1922, Ralph

CLASSIFIED LIST OF MECHANICAL EQUIPMENT (Continued) FOR ALPHABETICAL INDEX, SEE PAGE 132

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Car Hauls, Cable and Chain
Link-Belt Co.

Cars, Charging
Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* United States Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co.

Castings, Brass
DuPont Engineering Co.
Weatherly Foundry & Mfg. Co.

Castings, Brass & Bronze
* Lunkenheimer Co.

Castings, Die-Moulded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Gray Iron
DuPont Engineering Co.
Weatherly Foundry & Mfg. Co.

Castings, Heavy
* United States Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
* Cole, R. D. Mfg. Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Lunkenheimer Co.
* McClave Brooks Co.
* Royersford Fdry. & Mch. Co.
* United States Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Lunkenheimer Co.
* Vogt, Henry Machine Co.

Castings, Steel
Mackintosh-Hemphill Co.

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugal Blowers, Pumps
(See Blowers, Pumps, etc., Centrifugal)

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chain Grate Stokers
(See Stokers, Chain Grate)

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corp'n

Charging Machines
Whiting Corp'n

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Steel
(See Stacks, Steel)

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Magnetic
* Heald Machine Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Hendrick Mfg. Co.

Chutes, Gravity
Link-Belt Co.

Cinder Mills
(See Mills, Cinder)

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Clamps, Wire Rope
(See Wire Rope Fastenings)

Cloth, Rubber
Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Electric Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compounds, Boiler
Unisol Mfg. Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
Novo Engine Co.
* Titusville Iron Works Co.
Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Concrete Hardener
Sonneborn, L. Sons (Inc.)

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* United States Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co
* General Electric Co.
* Simplex Valve & Meter Co.

Converters, Steel
Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
*Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.

Conveyors, Gravity (Roller)
Link-Belt Co.

Conveyors, Ice
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
* Gifford-Wood Co.
Link-Belt Co.

Coolers, Brine
* Frick Co. (Inc.)

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Corliss Engines
(See Engines, Steam, Corliss)

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Couplings, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Fawcus Machine Co
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
* Medart Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Royersford Foundry & Machine Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Union
(See Unions)

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

H. Sweetser. Iron Trade Rev., vol. 72, no. 1, Jan. 4, 1923, pp. 57–58. Increased use of heavy scrap, general adoption of rating plant, reduction in use of hand labor, and exceptional production records, are among signs of advance in blast-furnace practice.

BOILER FEEDWATER

Air Removal from. Removal of Air from Feed Water. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 47–49, 3 figs. Methods in use to reduce corrosion caused by dissolved oxygen.

Hardness, Tests of. Causes of Hardness in Water and How to Find Them. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 36–43, 12 figs. Tests for impurities, treatment required, apparatus used and results which may be secured by proper care.

Oil-Removing Filters. Filters for Removing Oil from Boiler Feed Water, Leonard A. Day. Am. Water Works Assn.—JL., vol. 10, no. 1, Jan. 1923, pp. 145–116, 1 fig. Method successfully in use for about 20 years at St. Louis water works.

Regulators. Principles Governing Automatic Regulation. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 54–56, 5 figs. Feedwater valve control, pump governors, value of high and low-level alarms.

Treatment. A Review of Feed-Water Treatment. Power, vol. 56, no. 26, Dec. 26, 1922, pp. 1018–1020. Outstanding facts about various methods of treatment.

Boiler Feed Water Should Be Freed From Impurities. C. E. Joos. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 34–36, 3 figs. Those most commonly found, their effects in boiler and corrective treatment.

BOILER FURNACES

Draft Control. Draft Control Essential to Use of Moist Fuels, Zuce Kogan. Power Plant Eng., vol. 27, no. 2, Jan. 15, 1923, pp. 118–120, 4 figs. Air must be supplied through fuel bed and into gas space; means employed for control of draft.

Oil-Fired. Korting Oil-Burning Furnace (Die letzte Entwickelung der Korting-Oelfeuerungen), Pradel. Gewerbefleiss, vol. 101, no. 11, Nov. 1922, pp. 313–318, 4 figs. Specially suitable for marine purposes and chemical and metallurgical plants. Discusses burners and atomizers, including air-pressure and steam-jet centrifugal atomizers.

BOILER OPERATION

Feeding, Effect on. Effect of Boiler Feeding on Operation. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 53–54, 3 figs. Effect of varying water level, irregular and regular methods of feeding.

Instruments. New Devices for Controlling Operations (Neue Betriebskontrollapparate). Wärme- u. Kälte-Technik, vol. 24, no. 22, Nov. 15, 1922, pp. 257–261, 11 figs. Describes apparatus built by Hydro Apparate-Bauanstalt, for measuring consumption of gas, air, etc., and for determination of specific gravity; distance control of apparatus.

BOILER PLANTS

Oil-Fired. Petroleum as Fuel in Sugar Refineries (El petróleo como combustible en las refinerías de azúcar), Claude Brown. Ingeniería Internacional, vol. 9, no. 2, Feb. 1923, pp. 78–82, 6 figs. Describes modern boiler plant for oil firing exclusively, with automatic regulation, and variable steam consumption.

Power, Cost of. Reducing the Cost of Power Generation (Reduction des dépenses de force motrice), Ch. Molette. Outillage, vol. 6, no. 45, Nov. 11, 1922, pp. 1522–1525. Boiler-house conditions, fuels, steam raising, stoking, etc.

BOILER PLATE

Cold Water on Red-Hot, Action of. Exploding an Old-Time Boiler Fallacy, W. B. Roberts. Power House, vol. 15, no. 24, Dec. 20, 1922, pp. 19–21, 5 figs. Analysis of theory that cold water sprayed upon a red-hot boiler plate instantly generates an uncontrollable volume of steam.

Stresses. The Stress of Sheet Iron Due to Riveting and the Brittleness of Mild Steel Resulting from the Heating of Crushed Material (Beanspruchung der Bleche beim Nieten und die Sprödigkeit von Flusseisen als Folge der Erwärmung gequetschten Baustoffes), Richard Baumann. Stahl u. Eisen, vol. 42, no. 51, Dec. 21, 1922, pp. 1865–1868, 3 figs. Stress of sheet metal beyond stretching limit under high riveting pressures, but also under normal pressure due to heat stresses; injurious effects; devices for reducing stresses.

BOILER ROOMS

Losses, Prevention of. Analyzing the Prevention of Boiler Room Losses, E. M. Eliot. Indus. Management (N. Y.), vol. 65, no. 1, Jan. 1923, pp. 46–48, 1 fig. Outlines method of analyzing various boiler-room efficiency devices from standpoint of immediate importance to individual plant.

BOILERS

Baffling. Tests of a Large Type W Stirling Boiler, Paul W. Thompson. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 25–31 and 44, 13 figs. Deals with extensive tests on large boiler at Connors Creek power house of Detroit Edison Co.; four different arrangements of boiler baffling were employed and results obtained with each are shown. (Abridged.)

Locomotive. See LOCOMOTIVE BOILERS.

Magazine Feed. Tests of a Magazine Feed Boiler, Special Method of Supplying Secondary Air, John Blizard, J. Niel and A. Pincus. Am. Soc. Heating & Vent. Engrs.—JL., vol. 28, no. 9, Dec. 1922, pp. 833–842, 5 figs. Tests carried out by fuel section of U. S. Bur. of Mines on boiler made by Reck Heating Co., Copenhagen, Denmark, to determine its thermal efficiency and other important factors when fired with various fuels.

Settings. Boiler Settings (Uber die Einmauerung von Dampfkesseln), F. Otto H. Binder. Wärme- u. Kälte-Technik, vol. 24, no. 23, Dec. 1, 1922, pp. 269–271, 5 figs. Discusses boiler settings in connection with heat transmission and describes Topf system of arched walls.

BORING MACHINES

Vertical. The Modern Vertical Boring Mill. British Machine Tool Engineering, vol. 2, no. 18, Nov.-Dec. 1922, pp. 557–564, 12 figs. Details of machines as built by Geo. Richards & Co., Ltd., Manchester, Eng.

Work-Holding Schemes for. Work-Holding Schemes for Boring and Turning Mills. Eng. Production, vol. 5, no. 116, Dec. 21, 1922, pp. 580–584, 19 figs. Refers to number of work-holding arrangements devised to meet conditions largely peculiar to this class of tool.

BRAKES

Air. Railway Shop Kinks. Ry. & Locomotive Eng., vol. 36, no. 1, Jan. 1923, pp. 20–22, 6 figs. Special devices used for testing and maintaining air-brake equipment.

BRONZES

Analysis. The Analysis of Bronze, E. W. Sheel. Metal Industry (Lond.), vol. 21, no. 24, Dec. 15, 1922, pp. 553–554. Determination of tin, lead, copper, iron, manganese, zinc, phosphorus, and alternative method for determination of lead.

C

CABLEWAYS

Systems. Aerial Wire-Rope Conveyors (Transporteurs aériens à cables), F. Cretin. Génie Civil, vol. 81, nos. 22, 23 and 24, Nov. 25, Dec. 2 and 9, 1922, pp. 486–491, 510–512 and 532–534, 46 figs. Describes cableways of various systems; construction of lines; rolling equipment; operation and control coupling stability of cars.

CAR LIGHTING

Systems. Some Train Lighting Systems, Cyril T. Cocks. S. African Instn. Elec. Engrs.—Trans., vol. 13, part 8, Oct. 1922, pp. 167–179, 10 figs. on supp. plate. Discusses straight storage-battery, head-end and axle generator systems; systems in use in various countries; auto cut-in switch used on described Liliput machine; accumulators and belting.

Trouble Locating and Repairing. Principles of Car Lighting by Electricity, C. W. T. Stuart. Ry. Elec. Engr., vol. 13, no. 12, Dec. 1922, pp. 411–418, 28 figs. Discussion of various methods and tools used in locating troubles in generators and other equipment.

CAR WHEELS

Chilled-Iron. An Investigation of the Properties of Chilled Iron Car Wheels—II, J. M. Snodgrass and F. H. Guldner. University of Ill. Bull., vol. 20, no. 12, Nov. 20, 1922, 58 pp., 46 figs. Wheel fit, static load, and flange pressure strains; ultimate strength of flange.

Tires, Brake-Shoe Force on. Measuring the Force Exerted by a Brake Shoe on the Tire of a Wheel (Mesure pratique de l'effort exercé par le serrage d'un sabot-frein contre le bandage d'une roue de wagon), Alexandre Grison. Revue Générale des Chemins de Fer des Tramways, vol. 41, no. 6, Dec. 1922, pp. 385–392, 6 figs. Application of crushers; describes a hydraulic dynamometer, its construction and operation.

CARBON MONOXIDE

Poisoning. The Treatment of Carbon Monoxide Poisoning, R. R. Sayers and H. R. O'Brien. Can. Foundryman, vol. 13, no. 12, Dec. 1922, pp. 22–23. Fumes from cupola, gas engine, leaky stove or any place where carbon gas is present, are injurious to health, on account of effect on blood. Article prepared for U. S. Pub. Health Service.

CARBURETORS

Exhaust-Gas Analysis, Adjustment by. Adjusting Carburetors by Exhaust Gas Analysis. Automotive Industries, vol. 48, no. 1, Jan. 4, 1923, pp. 18–20, 2 figs. Maximum of carbon dioxide in exhaust gas 13.5 per cent. Government develops practical testing methods; application of methods effects fuel economy.

Sediment Deposit in. Sediment Deposit in Carburetors. Air Service Information Circular, vol. 4, no. 390, Nov. 1, 1922, 3 pp. Investigation to determine chemical content of sediment often encountered in carburetors, cause of its formation, and means of overcoming difficulty.

CARS

Oscillation. Oscillation of Railway Cars in Relation to the Track (Schwingungen am Eisenbahnwagen in ihrer Beiziehung zum Gleis), Saller. Zentralblatt der Bauverwaltung, vol. 42, no. 99, Dec. 9, 1922, pp. 608–610, 1 fig. Danger of coincidence of several periods of oscillations; variation of length of rails to avoid coincidence; vertical oscillations; calculations.

CARS, COAL

Gondola. 100-Ton Gondola Car with Four-Wheel Trucks. Ry. Mech. Engr., vol. 97, no. 1, Jan. 1923, pp. 23–25, 4 figs. High-capacity experimental car built by Pressed Steel Car Co. carried 77.2 per cent revenue load.

CARS, FREIGHT

All-Steel. All-Steel Automobile Car Construction on the U. P. System. Ry. Rev., vol. 72, no. 1, Jan. 6, 1923, pp. 52–58, 8 figs. Low maintenance cost for all-steel cars built in 1914 leads to construction of 1000 new cars in 1922.

Narrow-Gage Lines. Freight Cars for Narrow-Gage Lines (Matériel à marchandises des réseaux à voie étroite), M. Michaut. Revue Générale des Chemins de Fer et des Tramways, vol. 41, no. 6, Dec. 1922, pp. 378–384, 4 figs. Difficulties due to difference in tires and couplings of separately-owned rolling stock, and efforts made by French Minister of Public Works to secure uniformity so as to be able to pass rolling stock from line to line.

Production 1922. Freight-Car Industry in 1922. Ry. Rev., vol. 72, no. 1, Jan. 6, 1923, pp. 39–51, 31 figs. Statistics of production in United States. Representative examples of box and automobile, refrigerator, gondola, steel hopper and ore-carrying cars.

CARS, PASSENGER

Dining. Pennsylvania System Dining Cars Built at Altoona. Ry. Mech. Engr., vol. 96, no. 12, Dec. 1922, pp. 699–701, 6 figs. Features of design are attractive interior finish, kitchen equipment and cast-steel truck side frames.

Mountain-Observation. Mountain Observation Cars, Canadian National Railways. Can. Ry. & Mar. World, no. 298, Dec. 1922, pp. 601–602, 2 figs. Description of cars consisting of enclosed central interior portion with open observation platform at each end, converted from sleeping cars, to be used in Rocky Mountains for transcontinental service between Jasper and Kamloops, B. C.

CARS, TANK

Rotary. A Rotary Tank Car for Transportation of Bulk Materials, Rudolph Welcker. Ry. Rev., vol. 71, no. 26, Dec. 23, 1922, pp. 902–904, 6 figs. Designed to reduce time and expense for handling, loading and unloading grain, cement, ballast, etc.

CASE-HARDENING

Steel. Notes on Case-Hardening, Ernest J. Davies. Metal Industry (Lond.), vol. 21, no. 26, Dec. 29, 1922, pp. 607–608. Steel to be used; heat treatment of case-hardening steels; cementing medium.

CAST IRON

Metallography. The Metallography of Grey Cast Iron, Francis W. Rowe. Metal Industry (Lond.), vol. 21, nos. 24 and 25, Dec. 15 and 22, 1922, pp. 563–565 and 583–584, 13 figs. Outlines fundamentals and present trend of ideas regarding metallographic nature of this complex material.

Sampling. Sampling Cast Iron (Prelevamento dei campioni nelle ghise), Luigi Losana and Carmelo Cimino. Giornale di Chimica Industriale ed Applicata, vol. 4, no. 11, Nov. 1922, pp. 521–525, 4 figs. Discusses the various constituents of melt, and method of taking samples for analysis; variation of graphite in melt.

Special Metals, Effect of. The Effect of Special Elements on Cast-iron, O. Smalley. Foundry Trade Jl., vol. 26, no. 331, Dec. 21, 1922, pp. 519–523, 5 figs. Deals with carbon problem of cast iron, presents exploratory experiments on effect of various special metals, such as Cu, Ni, Cr, Mo, W, etc., on quantity and form of graphite, and considers commercial possibility of direct manufacture of alloy malleable from cupola.

CENTRAL STATIONS

Gennevilliers, France. The Gennevilliers Central Station (Unión de las centrales productoras de energía eléctrica en la región de Paris. La nueva central de Gennevilliers), Felix Vague Moreno. Asociación de Ingenieros del Instituto Católico de Artes e Industrias-Anales, vol. 1, no. 5, 1922, pp. 382–391, 14 figs. General description of construction work, buildings for machinery, the 40,000-kw. turbo-alternator units, safety in operation, etc.

Liverpool, England. The Liverpool Electricity and Tramway Undertakings. Elec. Rev., vol. 91, no. 2351, Dec. 15, 1922, pp. 906–909, 7 figs. Plant now comprises one 10,000-kw. Brit. Westinghouse turbo-alternator, two 6000-kw. and two 3500-kw. Brit. Thomson-Houston turbo alternators and two 2000-kw. Brit. Westingthouse d.c. turbo-generators. Automatic substation.

COAL HANDLING

Piers. Coal Wharf and Machinery of the North-Western Fuel Company of America. Engineer, vol. 134, nos. 3493, 3494, and 3495, Dec. 8, 15 and 22, 1922, pp. 595–596, 4 figs., partly on p. 608, 623–624, 1 fig., and 653–656, 8 figs. partly on p. 666. New coal pier for railway, steamship and cart service, built at Duluth, on Lake Superior, provides for receiving, shipping, screening and storage of anthracite and bituminous coal in large quantities at very low cost by extensive use of machinery.

Pneumatic, Suction Method. British Practice in Handling Coal by Suction, C. H. S. Tupholme. Am. Gas Jl., vol. 117, no. 28, Dec. 9, 1922, pp. 645–649, 9 figs. General description and operation of pneumatic coal-handling plants.

Scraper Loading. Some Recent Developments in Scraper Loading Methods, J. S. Housman. Coal Age, vol. 23, no. 2, Jan. 11, 1923, pp. 51–57, 19 figs. Scraper used for storage and reclaiming of coal on surface; self-transporting chute for loading cars underground, with equipment for operating scraper and illuminating face; keeps ropes off heading.

COKE HANDLING

Loading and Unloading. Mechanical Coke-Loading and Unloading Arrangements (Mechanische Koks-

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n.

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corp'n.

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corp'n.

Cranes, Locomotive
* Brown Hoisting Machinery Co.
Link-Belt Co.
Whiting Corp'n.

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works
Whiting Corp'n.

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Crank Shafts
Link-Belt Co.

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Roll
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cupolas
* Bigelow Co.
Northern Engineering Works
Whiting Corp'n

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
Haynes Stellite Co.
* Whitney Mfg. Co.

Cylinders Rebored
* Hooven, Owens, Rentschler Co.

Damper Regulators
(See Regulators, Damper)

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Diaphragms, Rubber
United States Rubber Co.

Die Castings
(See Castings, Die Moulded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Blanking
* Bliss, E. W. Co.

Dies, Punching
* Bliss, E. W. Co.

Dies, Sheet Metal Working
* Bliss, E. W. Co.

Dies, Thread Cutting
Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Drafting Room Furniture
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Drawing Instruments
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Drawing Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Lidgerwood Mfg. Co.
* Morris Machine Works

Dredging Sleeve
United States Rubber Co.

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
* Johns-Manville (Inc.)

Drop Forgings, Hammers, etc.
(See Forgings, Hammers, etc., Drop)

Dryers, Coal (Centrifugal)
Link-Belt Co.

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.
Link-Belt Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Philadelphia Drying Machinery Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
Clarage Fan Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.

Dustproofing Materials
Sonneborn, L. Sons (Inc.)

Dyeing Machinery
Philadelphia Drying Machinery Co.

Dynamic Balancing Machines
(See Balancing Machines, Dynamic)

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Electric Generators, Hoists, Trucks Welding, etc.
(See Generators, Hoists, Trucks, Welding, etc., Electric)

Electric Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Electric Measuring Instruments
(See Instruments, Electrical Measuring)

Electric Supplies
* General Electric Co.
* Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Elevators, Electric
Northern Engineering Works

Elevators, Hydraulic
Whiting Corp'n

Elevators, Inclined
Link-Belt Co.

Elevators, Passenger and Freight
Northern Engineering Works

Elevators, Pneumatic
Whiting Corp'n

Elevators, Portable
Link-Belt Co.

Elevators, Telescopic
Link-Belt Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.

Engine Stops
* Schutte & Koerting Co.

Engineers, Consulting
(See Professional Engineering Service Section)

Engines, Blowing
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Engines, Distillate
Western Machinery Co.

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Novo Engine Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
Western Machinery Co.

Engines, Gasoline
* Climax Engineering Co.
Novo Engine Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
Clyde Iron Works Sales Co.
* Hooven, Owens, Rentschler Co.
* Lidgerwood Mfg. Co.
* Morris Machine Works
Western Machinery Co.

Engines, Kerosene
* Climax Engineering Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Climax Engineering Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
Sterling Engine Co.
* Ward, Chas. Engineering Wks.
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
Western Machinery Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Otto Engine Works
* Titusville Iron Works Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Morris Machine Works
Sterling Engine Co.
Western Machinery Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* Brownell Co.
Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks
* Erie City Iron Works
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Ridgway Dynamo & Engine Co
* Titusville Iron Works Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks
* Erie City Iron Works
Harrisburg Foundry & Machine Works
* Leffel, James & Co.
* Troy Engine & Machine Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Vilter Mfg. Co.

Engines, Steam, High Speed
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks
* Erie City Iron Works
Harrisburg Foundry & Machine Works

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Vilter Mfg. Co

Engines, Steam, Throttling
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
Harrisburg Foundry & Machine Works
* Ridgway Dynamo & Engine Co
Stumpf Una-Flow Engine Co (Inc.)

Engines, Steam, Variable Speed
* Brownell Co.
Harrisburg Foundry & Machine Works

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
Clarage Fan Co.

Exhausters, Gas
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Expansion Joints
(See Joints, Expansion)

Extractors, Centrifugal
Tolhurst Machine Works

Extractors Oil and Grease
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Machinery Co.

Fans, Exhaust, Mine
Clarage Fan Co.

Feed Water Circulators, Heaters, Heaters and Purifiers, etc.
(See Circulators, Heaters, Heaters and Purifiers, etc., Feed Water)

Feed Water Controllers
(See Regulators, Feed Water)

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Filters, Gravity
* Permutit Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Graver Corp'n
* Permutit Co.

Filters, Water
Elliott Co.
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

lösch-und-verladeeinrichtungen), A. Thau. Stahl u. Eisen, vol. 42, nos. 50 and 51, Dec. 14 and 21, 1922, pp. 1838–1843 and 1868–1874, 17 figs. Brief description of new devices for coke ovens without coking ramps, with inclined and flat ramps; mechanical coke shovels; economy of different arrangements; future development.

COLD STORAGE

Warehouse. A Massive Cold Storage Warehouse. Contract Rec., vol. 36, no. 52, Dec. 27, 1922, pp. 1233–1240, 9 figs. One of largest buildings of its kind in world; floors of flat-slab construction; fireproof precautions; cold-storage equipment; insulation of storage rooms; power house.

COMBUSTION

Control. Combustion Control Apparatus. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 8–11, 5 figs. Automatic regulation of damper position, fuel feed, and under-grate pressure conducive to higher furnace efficiency.

Tests. Tests for Good Combustion and Heat Transfer. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 25–27, 5 figs. Regulation of air supply; ensuring mixture of gases and high temperature; tests of temperatures and analysis of flue gases.

COMPRESSED AIR

Coal Mines. Notes on Compressed Air. D. H. Currer Briggs. Iron & Coal Trades Rev., vol. 105, no. 2859, Dec. 15, 1922, pp. 877–878, 4 figs.; also Colliery Guardian, vol. 124, no. 3233, Dec. 15, 1922, pp. 1469–1470, 6 figs. Results of practical tests and observations showing widespread waste and inefficiency in use of compressed air for coal mining purposes. (Abstract.) Paper read before Midland Inst. Min., Civ. & Mech. Engrs.

CONDENSERS, STEAM

Jet. Modern Jet Condensers in Small Lighting Plants. R. E. Hellmer. Gen. Elec. Rev., vol. 26, no. 1, Jan. 1923, pp. 55–60, 8 figs. Describes variety of installations of type manufactured by Schutte & Koerting Co.

CONNECTING RODS

Machining. Making Plain and Forked Connecting Rods. Machy. (Lond.), vol. 21, nos. 531 and 535, Nov. 30 and Dec. 28, 1922, pp. 265–269 and 401–405, 20 figs. Manufacturing methods employed for machining high-grade automobile connecting rods.

V-Type Engines. Connecting Rods for V-Type Engines. Automobile Engr., vol. 12, no. 171, Dec. 1922, p. 407, 3 figs. Consideration of certain factors affecting their arrangement.

CONVEYORS

Rope-Type. Roe's Patent Rope Conveyor. Iron & Coal Trades Rev., vol. 105, no. 2857, Dec. 1, 1922, p. 808, 4 figs. partly on p. 809. Success of described conveyor is said to be due entirely to fact that slats or carrying members are attached to one rope only, their other end merely resting upon and deriving support from other rope or ropes.

Workshop. Methods of Conveying in the Workshop. Machy. (Lond.), vol. 21, no. 533, Dec. 14, 1922, pp. 321–327, 15 figs. Overhead runways; combined runways and traveling cranes; electric and pneumatic hoisting gear; portable cranes.

COPPER ALLOYS

Manganin. The Electrical Resistivity and its Temperature Coefficient of Manganin, S. Kimura and K. Sakamaki. Electrotechnical Laboratory—Researches, no. 114, Sept. 1922, 10 pp., 2 figs. Investigation of copper-manganese alloys and effects of other elements such as Ni, Fe, Al and Si upon them.

CORROSION

Problems. Problems of Corrosion, B. D. Saklatwalla. Jl. Indu. & Eng. Chem., vol. 15, no. 1, Jan. 1923, pp. 39–40. Points out importance of study of physical nature of constituent aggregates and forces governing their reaction activity.

Technical Phases. The Economic Aspect of Corrosion from an Engineering Standpoint, B. D. Saklatwalla. Raw Material, vol. 5, no. 11, Dec. 1922, pp. 425–426. Sets forth what has been done to overcome losses from corrosion and what it is hoped to accomplish in future.

COST ACCOUNTING

Factory. The Engineer and Manufacturing Costs, F. C. Lawrence. Instn. Elec. Engrs.—Jl., vol. 61, no. 313, Dec. 1922, pp. 52–58. Example of methods of calculating job costs; proportions of components of factory costs of various engineering products; use of mechanical appliances in various calculations to give accuracy and save time in arriving at costs.

Relative Cost Numbers. The Relation of Overhead to Direct Labor Cost, J. H. Simpson, Jr. Indus. Management (N. Y.), vol. 65, no. 1, Jan. 1923, p. 12. Points out benefits afforded by use of relative cost number, as developed by Taylor and others.

Small Shops. Keeping Track of Costs in the Small Shop, G. Blake. Can. Machy., vol. 28, no. 23, Dec. 7, 1922, pp. 34–36, 9 figs. Successful system for light manufacturing; recording work of skilled and unskilled labor; planning details; simple card system.

CRANES

Steam. Standard Steam Cranes and Their Employment (Normale Dampfkrane und ihre Verwendung), H. Benedict. Schiffbau, vol. 24, no. 11, Dec. 13 1922, pp. 171–173, 3 figs. Describes standard cranes as constructed by German Machine Factory, Inc., Duisburg (Demag), and its use.

Wrecking. High-Capacity Steam Breakdown Cranes. Ry. Gaz., vol. 37, no. 23, Dec. 8, 1922, pp. 753–755 and 757, 7 figs. Constructed by Craven Bros., Manchester, England, for S. African and Egyptian state railways.

CUPOLAS

Heat Balance. Heat Balance in a Cupola Furnace (Remarques sur les bilans thermiques des cubilots à fonte), J. Seigle. Fonderie Moderne, no. 11, Nov. 1922, pp. 60–62 (Supp.). Data entering into heat balance in cupola furnaces on second melting of pig iron.

CYLINDERS

Fluid Resistance of. Further Information on the Laws of Fluid Resistance, C. Wieselsberger. Nat. Advisory Committee for Aeronautics, Tech. Notes, no. 121, Dec. 1922, 11 pp., 4 figs. Determination of behavior of cylinder of finite length, in as large a range as possible of Reynolds numbers, and dependence of drag coefficient on ratio of diameter of cylinder to its length; etc. Translated from Physikalische Zeit., vol. 23, 1922, pp. 219–224.

Founding. Scientific Control in Motor Cylinder Founding, G. H. Judd. Foundry Trade Jl., vol. 26, no. 332, Dec. 28, 1922, pp. 528–530. Author concentrates on part played by works' chemist or metallurgist.

D

DIE CASTING

Aluminum and Brass. Die Casting, Sam Tour. Jl. Indus. & Eng. Chem., vol. 15, no. 1, Jan. 1923, pp. 25–28, 7 figs. Alloys used for casting; life and thermal fatigue of dies; aluminum and brass die castings.

DIES

Sectional. Sectional Blanking and Piercing Dies, Fred R. Daniels. Machy. (N. Y.), vol. 29, no. 5, Jan. 1923, pp. 339–343, 10 figs. Advantages of sectional dies and methods used in their construction.

DIESEL ENGINES

Four- vs. Two-Stroke-Cycle. The Relative Advantages of the Four-Stroke and Two-Stroke Cycle Marine Diesel Engine, A. S. Watkinson. Engineering, vol. 115, no. 2975, Jan. 5, 1923, pp. 28–30. Consideration of weight, space occupied, fuel consumption, cost of machinery, cylinder covers, pistons, lubrication, valves, etc. and mechanical and structural considerations.

Opposed-Piston. The Opposed-Piston Principle for High-Power Diesel Engines. Power, vol. 57, no. 2, Jan. 9, 1923, pp. 56–57, 3 figs. Deals with British practice.

DRILLING MACHINES

Multiple-Spindle. Single Hole Drilling on a Multiple-Spindle Machine, W. F. Sandmann. Am. Mach., vol. 57, no. 26, Dec. 28, 1922, pp. 989–990, 5 figs. An example of interchangeable fixture and machine set-up for single-hole work is that used for drilling and reaming of drop-forged plier halves.

E

EDUCATION

Technical School and Practical Training. The Training of Engineers (Zur Ingenieurerziehung), G. Lippart. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 50, Dec. 16, 1922, pp. 1109–1113. Discusses demands made upon technical schools for practical requirements of engineers in general and mechanical engineers in particular; what practical experience does for the engineer; and how cooperation between technical school and practical engineering can best be achieved.

Training for Industries. Helpful Relations Between the College and the Industries, R. L. Wales. Eng. Education, vol. 13, no. 3, Nov. 1922, pp. 136–146. Deals with problem of mutual helpfulness of colleges and industries.

EDUCATION, ENGINEERING

France. On the Education of Engineers in France, A. E. Kennelly. Eng. Education, vol. 13, no. 3, Nov. 1922, pp. 89–118, 2 figs. Emphasizes differences between French and American teaching of applied science, leaving aside very many matters in which two are alike. Bibliography.

ELECTRIC DRIVE

Lumber Industry. Motor Applications in the Lumber Industry, Gordon Fox. Power Plant Eng., vol. 27, no. 2, Jan. 15, 1923, pp. 130–132, 2 figs. Because of its lower cost of power and absence of fire risk, electric motor is rapidly displacing donkey steam engine.

Paper Mills. Improving the Efficiency in the Paper Industry (Beitrag zur Verbesserung des Leistungsfaktors in der Papierindustrie), Max Rimmelspacher Elektrotechnischer Anzieger, vol. 39, nos. 191 and 192, Nov. 30 and Dec. 2, 1922, pp. 1494–1495 and 1501–1502, 6 figs. Discusses utilization of electric power to best advantage and compares different types of electric machinery from this point of view.

Steel Mills. Electric Power in Iron and Steel Works. Elecn., vol. 89, no. 2323, Nov. 24, 1922, Contains following articles: Advantages of Generation and Transmission by Alternating Current Emphasized, A. Davidson, pp. 594–596. Alternating Current and Iron and Steelworks Practice, J. Percy Hodges, pp. 597–600, 7 figs. Selection of Electrical Systems for Iron and Steelworks, J. Macsheehy, pp. 601–607, 3 figs.

ELECTRIC FURNACES

Arc. Characteristics of Arc Furnaces, Especially the Heroult Furnace (Karakteristiske forhold ved lysbueovner, spesielt Héroultovner), S. Selmer-Olsen. Teknisk Ukeblad, vol. 69, no. 47, Nov. 24, 1922, pp. 427–428, 4 figs. Power consumption; current variation; load factor; etc.

Brass. Electric Brass Furnace Practice, H. W. Gillett and E. L. Mack. U. S. Bur. of Mines, Bul. no. 202, 1922, 334 pp., 71 figs., 55 tables. Monetary saving possible; work of Bur. of Mines; different types of electric furnaces; theoretical and practical advantages; differences between brass and steel melting; types of steel furnaces and their drawbacks for brass melting; types of brass furnaces; terminology and fundamental electric principles; crucible, hearth-type, and arc furnaces; furnaces in which metal itself is resistor; testing furnaces; future development. Bibliography.

Heat-Treating. Electric Furnaces for Heat Treatment of Steel, A. W. Lamont. Eng. Jl. (Eng. Inst. Can.), vol. 6, no. 1, Jan. 1923, pp. 3–6, 7 figs. Special features of design and operation, with particular reference to furnace of Transcona shops of Can. Nat. Rys.

Induction. A New Induction Furnace, J. Murray Weed. Metal Industry (Lond.), vol. 21, no. 23, Dec. 8, 1922, pp. 523–533, 3 figs. For melting non-ferrous metals; possesses some features which differ radically from those found in any previous furnace and affords great flexibility of design and broad scope of application. Summary from paper read before Am. Inst. Metals.

Non-Ferrous. Application of Electric Furnaces to Melting of Non-Ferrous Metals and Alloys (L'application des fours électriques à la fusion des métaux et alliages non ferreux), A. Billaz. Vie Technique et Industrielle, vol. 4, nos. 37 and 38, Oct. and Nov. 1922, pp. 21–31 and 91–101, 30 figs. Reverberatory, direct-arc and indirect-arc furnaces including types used in United States; heat balance and heat losses; power consumption, induction furnaces; compares results obtained with principle types, including power consumption, consumption of electrodes, power factor, etc. Bibliography.

Reduction. Electric Reduction Furnace Iron for a Steel Making Base, R. C. Gosrow. Jl. Electricity & West. Industry, vol. 50, no. 1, Jan. 1, 1923, pp. 16–17. Points out economy of its use for production of steel from steel pig.

Resistance Type. Heat in Resistance Furnace. Foundry, vol. 50, no. 23, Dec. 1, 1922, pp. 956–957, 2 figs. Describes graphite-resistor-type furnace at plant of Bario Metals Corp., developed by J. Ryan & Co., having holding capacity of 125 lb. per heat and capable of melting and refining alloy mixtures in from 30 to 40 min.

Steel. Electric Steel Industry After Ten Years, Edwin F. Cone. Iron Age, vol. 111, no. 1, Jan. 4, 1923, pp. 80–83. American industry credited with 406 furnaces against only 19 in 1913; Canadian and world's industry.

ELECTRIC LOCOMOTIVES

Efficiency. The Efficiency of Electric Locomotives (Die Leistungseigenschaften der Elektrolokomotive), A. Wichert. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 48, Dec. 2, 1922, pp. 1080–1085, 15 figs. Comparison with steam locomotives; limits of output. It is shown that planning of electric-railway schedule as well as determination of permissible load must be based on entirely different aspects than with steam locomotives in order to insure economical operation.

4000-Hp. 4,000-Hp. Electric Locomotives for N. & W. Elec. Ry. Jl., vol. 60, no. 27, Dec. 30, 1922, pp. 1012–1015, 4 figs. Four double-unit locomotives are under construction for Norfolk & West. Ry's Elkhorn grade and electrified extension.

Japanese Government. Electric Locomotives for Japanese Government. Elec. Ry. Jl., vol. 60, no. 26, Dec. 23, 1922, pp. 975–976, 2 figs. Equipped with motors specially designed for narrow gage, and have high-speed circuit breakers and new form of electropneumatic control; for 1500-volt d.c. operation.

Main-Line. Electric Locomotives for Main Line Railways. Beama, vol. 12, no. 6, Dec. 1922, pp. 830–833, 2 figs. Types of locomotives ordered from British manufacturers for South Africa and New Zealand.

ELECTRIC PLANTS

Birchills, England. The Walsall Electricity Undertaking. Engineer, vol. 134, no. 3494, Dec. 15, 1922, pp. 632–633, 3 figs. Details of Birchills power station with 6600-volt three-phase system.

Radcliffe, England. The Undertaking of the Lancashire Electric Power Company. Engineering, vol. 114, nos. 2973 and 2974, Dec. 22 and 29, 1922, pp. 762–764, and 792–795, 21 figs. partly on supp. plates and p. 774. Details of main generating station at Radcliffe and its growth since first four machines were started in 1905.

ELECTRIC RAILWAYS

Engineering Progress. Electric Railway Engineering Progress of the Past Year. Elec. Ry. Jl., vol. 61, no. 1, Jan. 6, 1923, pp. 11–22, 3 figs. Analysis of accomplishments made in track, car, power-plant, power-distribution and heavy-traction engineering, together with some comments on relation of engineering to general problems of transportation.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)
Fire Tube Boilers
(See Boilers. Return and Vertical Tubular)
Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
Fittings, Compression
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* United States Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.
Fittings, Hydraulic
* Crane Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.
Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.
Weatherly Foundry & Mfg. Co.
Fittings, Steel
* Crane Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.
Flanges
* American Spiral Pipe Works
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.
Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.
Flooring, Rubber
United States Rubber Co.
Flour Milling Machinery
* Allis-Chalmers Mfg. Co.
Fly Wheels
* Medart Co.
* Wood's, T. B. Sons Co.
Forges
* Best, W. N. Furnace & Burner Corp'n
Forgings, Drop
* Vogt, Henry Machine Co.
Foundry Equipment
Northern Engineering Works
Whiting Corp'n
Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)
Friction Drives
Rockwood Mfg. Co.
Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.
Fuel Economizers
(See Economizers, Fuel)
Furnace Construction
Furnace Engineering Co.
Furnace Linings
(See Linings, Furnace)
Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Whiting Corp'n
Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co.
Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)
Furnaces, Down Draft
* O'Brien, John Boiler Works Co.
Furnaces, Electric
Kenworthy, Chas. F. (Inc.)
Furnaces, Forging
Kenworthy, Chas. F. (Inc.)
Furnaces, Hardening
Kenworthy, Chas. F. (Inc.)
Furnaces, Heat Treating
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Whiting Corp'n
Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)
Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n
Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co
* Murphy Iron Works
* Riley, Sanford Stoker Co.
Fuses
* General Electric Co.
* Johns-Manville (Inc.)

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Gage Glasses
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.
Gages, Ball
* Atlas Ball Co.
* S K F Industries (Inc.)
Gages, Differential Pressure
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.
Gages, Draft
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.
Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Gages, Liquid Level
* Bristol Co.
* Lunkenheimer Co.
* Precision Instrument Co.
* Simplex Valve & Meter Co.
Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.
Gages, Measuring (Surface, Depth, Dial, etc.)
* Atlas Ball Co.
* Norma Co. of America
* S K F Industries (Inc.)
Gages, Pressure
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.
Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Precision Instrument Co.
* Simplex Valve & Meter Co.
Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.
Gages, Water
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.
Gages, Water Level
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.
Gas Analysis Apparatus
* Precision Instrument Co. (Inc.)
Gas Burners, Compressors, Engines, Exhausters, Producers, etc.
(See Burners, Compressors, Engines, Exhausters, Producers, etc., Gas)
Gas Collectors
* Precision Instrument Co. (Inc.)
Gas Holders
Improved Equipment Co.
Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.
Gas Plants
Improved Equipment Co.
Gas Washers
Improved Equipment Co.
Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)
Gaskets, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.
Gasoline
Texas Co.
Gates, Blast
Link-Belt Co.
Gates, Cut-off
Link-Belt Co.
Gates, Sluice
* Chapman Valve Mfg. Co.
Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co.
Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.
Gears, Cut
Brown, A. & F. Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Poole Engrg. & Mch. Co.
Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.
Gears, Machine Moulded
Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Gears, Rawhide
* James, D. O. Mfg. Co.
Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.
Link Belt Co.
Poole Engrg. & Mch. Co.
Gears, Worm
* Fawcus Machine Co.
Link-Belt Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.
Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Ridgway Dynamo & Engine Co.
Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
Governors, Water Wheel
* Worthington Pump & Machinery Corp'n
Granulators
* Smidth, F. L. & Co.
Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co.
Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave Brooks Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.
Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* McClave Brooks Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
Grates, Kiln
* McClave Brooks Co.
Grates, Rocking
* Brownell Co.
Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave Brooks Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
Grease Cups
(See Oil and Grease Cups)
Grease Extractors
(See Separators, Oil)
Greases
Dixon, Joseph Crucible Co.
* Royersford Foundry & Machine Co.
Texas Co.
Vacuum Oil Co.
Grinding Machinery
Brown, A. & F. Co.
* Smidth, F. L. & Co.
Grinding Machines, Chaser
* Landis Machine Co. (Inc.)
Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Foundry & Machine Co.
Grinding Machines, Internal
* Heald Machine Co.

ELECTRIC RAILWAYS, TRACK

Developments 1922. Track Extensions and Reconstruction Work Increased. Elec. Ry. Jl., vol. 61, no. 1, Jan. 6, 1923, pp. 51–53. Amount of new track built in 1922 showed small increase over that reported for 1920 and 1921; track reconstruction shows considerable increase.

ELECTRIC WELDING, ARC

Cast Iron. Electric Arc Welding of Cast Iron, W. H. Namack. Am. Welding Soc.—Jl., vol. 1, no. 11, Nov. 1922, pp. 7–33, 13 figs. Committee report of tests carried out and conclusions arrived at; preparation of parts to be welded, slag inclusions, current values, method of deposition, length of arc, nitrogen theory; specifications for testing commercial electrodes; size and preparation of samples; method of welding; testing.

Storage Tanks. Report of the Committee for the Electric Welding of Storage Tanks. Am. Welding Soc.—Jl., vol. 1, no. 12, Dec. 1922, pp. 16–19, 1 fig. Advantages of welded over riveted tank are set forth. Recommendations and suggestions.

ELECTRIC WELDING, RESISTANCE

Butt Welding. Butt Welding, A. L. De Leeuw. Am. Mach., vol. 58, no. 2, Jan. 11, 1923, pp. 61–64, 10 figs. Process of upset welding; hand and automatic machines; welding pieces of different sizes; tie welding and other applications.

Shipbuilding. Electric Resistance Welding in Shipbuilding (Die elektrische Widerstandsschweissung im Schiffbau), H. Neuburger. Schiffbau, vol. 24, no. 12–13, Dec. 20–27, 1922, pp. 198–201, 5 figs. Deals with German practice in spot, butt and seam welding.

EMPLOYEES' REPRESENTATION

Rockefeller Plan. Experimenting with the "Human Mechanics" of Industry, Jerome Davis. Indus. Management (N. Y.), vol. 65, no. 1, Jan. 1923, pp. 24–26. Labor representation in the Colorado Fuel & Iron Co.

EMPLOYEES, TRAINING OF

Railway. Cost of Training Establishments in German Railway Administration (Die Kosten der Unterrichtseinrichtungen bei der Deutschen Reichsbahn im Gesamtbilde der Wirtschaftlichkeit), Karl Gotter. Zeitung des Vereins Deutscher Eisenbahnverwaltungen), vol. 62, nos. 46 and 47, Dec. 7 and 14, 1922, pp. 885–888 and 901–904. Discusses capital outlay and upkeep for instruction of railway employees in Berlin district; additional help required to make up for absentees.

Employee Training Course of the Orleans Railway Company (Cours de perfectionnement du personnel du Service du Matériel et de la Traction de la Compagnie d'Orléans et wagon école servant d'annexe à ces cours), G. Chassagne. Revue Générale des Chemins de Fer et des Tramways, vol. 41, no. 6, Dec. 1922, pp. 361–377, 6 figs. Particulars of curriculum, equipment of instruction cars, etc.

ENERGY

Conservation, Germany. Conservation of Energy in Germany (Deutschlands Energiehaushalt), Zeit. für technische Physik, vol. 3, no. 11, 1922, pp. 337–348, 11 figs. Status of world's coal production; coal and lignite resources in Germany; petroleum resources; utilization of low-grade fuel; utilization of water, tidal and wind power. Bibliography.

ENGINEERING

Brazil. Development and Actual State of Engineering in Brazil (A evolucao e posiçao actual da engenharia no Brazil), Revista Brasileira de Engenharia, vol. 4, nos. 4 and 5, Oct. and Nov. 1922, pp. 200–222 and 255–263. Articles by different authors on present state of railroad, hydraulic, sanitary, telegraph and telephone engineering, bridges, and streets, and engineering activities in the various states.

ENGINEERS

Production. The Production Engineer, H. E. Honer. Eng. Production, vol. 5, no. 115, Dec. 14, 1922, pp. 578–579. His status and duties. Paper presented to Instn. Production Engrs.

ENGINEHOUSES

Erie R. R. Erie Builds New Enginehouse at Jersey City, N. J. Ry. Mech. Engr., vol. 96, no. 12, Dec. 1922, pp. 719–722, 4 figs. Old structure destroyed by fire is replaced without interference with locomotive operations.

EVAPORATORS

Vapor Recompression Systems. Vapor Recompression Systems for Evaporators, W. L. Badger. Chem. & Met. Eng., vol. 28, nos. 1, and 2, Jan. 3 and 10, 1923, pp. 26–31 and 73–78, 14 figs. Survey of advantages and shortcomings of regenerative evaporation; technical history of its development and analysis of recorded data on test runs. Comparison of operating economies with single- and multiple-effect evaporators. Bibliography of patents and literature.

F

FACTORIES

Gramophone. The Intensive Production of Gramophones. Eng. Production, vol. 5, nos. 116 and 117, Dec. 21 and 28, 1922, pp. 589–594, 32 figs. Layout and tooling equipment of Gramophone Co., Ltd., Middlesex, England.

Metal-Stamping Plant. 15,000 Tons of Material Consumed at the Pedlar Plant. Can. Machy., vol. 28, no. 26, Dec. 28, 1922, pp. 122–125 and 142, 10 figs. Processes, layout and equipment of plant of Pedlar People, Ltd., Oshawa. Shows line of drop presses for stamping steel ceilings, sidings, trimmings, etc.

Small. Establishing a Small Engineering Works, A. Whitehead. Indus. Management (Lond.), vol. 8, nos. 6, 9, 10, 11 and 12, Oct. 5, Nov. 16, 30, Dec. 14 and 28, 1922, pp. 191–192, 286–287, 314–316, 343–345 and 382–384, 6 figs. Principles adopted in appointing staff, organization and functions of production office.

FANS

Exhaust Work, for. The Design of Exhaust Systems, H. W. Pfeffer. Heating & Vent. Mag., vol. 19, no. 12, Dec. 1922, pp. 53–57, 5 figs. Data covering standard practice, based on experiments.

FEEDWATER HEATERS

Types. Plant Economy Demands Feed Water Heating. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 49–52, 8 figs. Types of heaters and their installation; saving effected.

FERROALLOYS

Industry 1922. The Ferroalloy Industry in 1922, Robert J. Anderson. Iron Age, vol. 111, no. 1, Jan. 4, 1923, pp. 58–61. Technical developments and market conditions reviewed.

FLIGHT

Prandtl's Aerofoil Theory. The Theory of the Aerofoil in Circling Flight (Zur Theorie des Tragflügels bei gekrümmter Flugbahn), C. Weiselsberger. Zeit. fur angewandte Mathematik u. Mechanik, vol. 2, no. 5, Oct. 1922, pp. 325–340, 10 figs. Investigation of problem of flight in a circling path, based on Prandtl's aerofoil theory.

FLOW OF AIR

Measurement. Measurement of Air Flow. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 15–16, 2 figs. Methods of determining amount of air passing in forced-draft installations.

FLOW OF FLUIDS

Theory. The Flow of Fluids in General (Etude sur l'écoulement des fluides en général), A. Lebrasseur and F. d'Espine. Chaleur et Industrie, vol. 3, nos. 27, 28, 29, 30, 31 and 32, July, Aug., Sept., Oct., Nov. and Dec. 1922, pp. 1432–1437, 1528–1535, 1608–1613, 1689–1696, 1787–1792 and 1870–1874, 28 figs. Fuel combustion; production, transportation and utilization of calorific energy; flow of gases; velocity and vicosity; coefficient of roughness in pipes; flow of compressible fluids; friction and expansion; formulas and equations.

FLOW OF GASES

Pipes. The Flow of Gases and Steam (L'écoulement des gaz et vapeurs). Métallurgie, vol. 51, no. 49, Dec. 7, 1922, pp. 1829–1831. Flow of gas and steam in tubes; formulas and calculations.

Pulsating Currents. Accelerated Reactions in Pulsating Gaseous Currents, Jules Deschamps and J. F. Shagden. Chem. & Met. Eng., vol. 27, no. 26, Dec. 27, 1922, pp. 1269–1271, 2 figs. Utilization of pulsations and vibrations of appropriate amplitude to accelerate physical interchanges and chemical reactions between gases and vapors in checkerworks, labyrinths, or piled-up solids.

FLOW OF LIQUIDS

Capillary. On the Flow of Liquids under Capillary Pressure, Eric Keightley Rideal. Lond., Edinburgh, and Dublin Philosophical Mag. & Jl. Sci., vol. 44, no. 264, Dec. 1922, pp. 1152–1159, 3 figs. Rate of penetration of liquids into capillary pores; phenomena of adsorption by charcoal and other materials.

FLUE-GAS ANALYSIS

Graphical Method. Flue-Gas Diagrams (Om rökgasdiagram), A Hallbäck and V. Christiansen. Teknisk Tidskrift, vol. 52, Dec. 16, 1922, pp. 801–806, 7 figs. Diagrams for various kinds of coal and coke; discusses variation of percentages of CO, CO_2, etc.

Indicators and Recorders. Flue Gas, Analyzers and CO_2 Recorders Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 30–33, 7 figs. Principles and methods of use of hand analyzers; getting correct gas samples; types of recorders.

Slide-Rule Method. Slide Rule for Combustion Data (Verbrennungsanalytischer Rechenstab), Arthur Gohmann. Feuerungstechnik, vol. 11, no. 5, Dec. 1, 1922, pp. 49–51, 2 figs. Calculates air supply and content of CO_2, CO, excess air, incomplete and complete combustion of different fuels, and gives slide rule for the purpose.

FLYING BOATS

Fokker Amphibian. The Fokker Amphibian Flying Boat. Aviation, vol. 14, no. 2, Jan. 8, 1923, pp. 44–45, 3 figs. All-metal boat, wooden wings and Warren truss chief characteristics of new ship.

Metal Wings. Successful Design of Light Weight Metal Wings Aviation, vol. 14, no. 2, Jan. 8, 1923, pp. 38–41, 9 figs. Metal wing frames built for Navy HS3 flying boat said to have given excellent results in tests at naval factory.

FOREMEN

Training. What Kind of Training for the Foremen? B. M. Nussbaum. Am. Mach., vol. 58, no. 1, Jan. 4, 1923, pp. 29–31. Tells of plans that have worked well in many plants.

FOUNDRIES

Quantity Production, Quality in. How Quality is Produced under Quantity Production Conditions. H. Cole Estep. Foundry Trade Jl., vol. 26, nos. 329, 330 and 331, Dec. 7, 14 and 21, pp. 459–461, 481–484 and 504–506, 6 figs. Notes on scientific control basis of quantity production; subdivision of labor; American basis for management; pyrometric control; mixing metal by analysis; results obtained by Cadillac Motor Car Co.; American malleable iron.

Safety Code. Safety Code to Protect Foundry Workers. Iron Age, vol. 111, no. 3, Jan. 18, 1923, pp. 217–220. American Engineering Standards Committee covers all problems pertaining to foundries; hazards of general character belong in general codes.

Specialty Lines. Are Foundries Developing Along Specialty Lines? F. H. Bell. Can. Machy., vol. 29, no. 1, Jan. 4, 1923, pp. 26–27 and 29, 4 figs. Recent building and equipment are said to indicate this; modern methods for handling material.

Steel. The Steel Foundry of Messrs. Thwaites Brothers. Foundry Trade Jl., vol. 26, no. 327, Nov. 23, 1922, pp. 423–426, 6 figs. Description of Vulcan Works, including foundry proper, physical and chemical laboratories, core shop, heat-treatment plant, and some of the operations.

FREIGHT HANDLING

Cost Analysis. Analysis of Cost of Freight Service, Grand Trunk Railway Company of Canada, J. P. Newell. Am. Soc. Civ. Engrs.—Proc., vol. 49, no. 1, Jan. 1923, pp. 1–36, 1 fig. Describes methods used which are said to be applicable to operations of any railroad.

Unloaders, Automatic. Increased Importance of Automatic Unloaders (Die erhöhte Bedeutung des Selbstentladewagens für unser Wirtschaftsleben), Wintermeyer. Fördertechnik u. Frachtverkehr, vol. 15, no. 25, Dec. 8, 1922, pp. 319–322, 8 figs. Describes various types of tipping and dumping cars used on railways.

FUELS

Measurement. Fuel Determination. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 16–18, 6 figs. Scales, meters and counters for measurement of coal; meters for oil measurement.

[See also LIGNITE; OIL FUEL; PULVERIZED COAL.]

FURNACES, ANNEALING

Fuel Economy. Fuel Economy in Connection with Annealing Furnaces—II, Chas. E. Wade. Metal Industry (Lond.), vol. 21, no. 21, Nov. 24, 1922, pp. 481–482. Producer-gas firing; blowing-in by steam jet; town-gas, coke, oil, and pulverized-fuel firing.

FURNACES, HEATING

Recuperative. Recuperative Raises Furnace Efficiency, William B. Chapman. Iron Trade Rev., vol. 72, no. 2, Jan. 11, 1923, pp. 163–164, 3 figs. Discussion of paper entitled Heating Furnaces for Blooms, Slabs and Billets, by W. P. Chandler, Jr., presented before Am. Iron & Steel Inst.

FURNACES, HOT-AIR

Design. Some Comments on Furnace Installation F. T. Giblin and Frank K. Chew. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 1, Jan. 1923, pp. 19–26, 4 figs. Comparison of good war-time system with rules of prominent authorities and with requirements of proposed furnace code.

Standard Code. Standard Code Regulating the Installation of Warm Air Furnaces in Residences. Am. Soc. Heating & Vent. Engrs. Jl.—vol. 28, no. 9, Dec. 1922, pp. 869–876. Code prepared by special committee.

FURNACES, INDUSTRIAL

Oil-Burning. Factors Affecting the Use of Air in Oil Burning with Comparison of Cost, W. C. Buell, Jr. Engrs.' Soc. West. Pa.—Proc., vol. 38, no. 6, July 1922, pp. 201–221 and (discussion) 222–226, 11 figs. Classification into three general types of oil burners, namely those employing "volume" air, those operating on "positive" air, and those utilizing "high-pressure" air.

FURNACES, METALLURGICAL

Vertical-Retort. The Fiechtl Vertical Retort Furnace for Zinc Ores, William Kapellmann. Eng. & Min. Jl.—Press, vol. 114, no. 27, Dec. 30, 1922, pp. 1153–1154, 2 figs. Greater simplicity of design and lower cost of erection and operation than with ordinary retort process are claimed; device tested by construction of four retorts at Kansas plant.

FURNACES, REVERBERATORY

Metal-Melting. Progress in Non-Ferrous Metal Melting. Metal Industry, (Lond.), vol. 21, no. 21, Nov. 24, 1922, pp. 483–485, 4 figs. Describes metal-melting furnace operating on reverberatory principle, placed on market by Brit. Reverberatory Furnaces, Ltd.

G

GAS PRODUCERS

Ash-Fusing. Ash-Fusing Gas Producers (Les gazogénes à fusion de cendres depuis l'origine jusqu'à 1921), A. Folliet. Chimie et Industrie, vol. 8, no. 5, Nov. 1922, pp. 965–973, 9 figs. Development. Describes Ebelmen, Witkowitz, Fichet, Würth, Pintsch, and Rehmann types, and explains system adopted by Saint-Etienne mining company to use fuels of any ash content.

Grinding Machines, Surface
* Heald Machine Co.
Guards (Electric Lamps)
Flexible Steel Lacing Co.
Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Bliss, E. W. Co.
* Franklin Machine Co.
Long & Allstatter Co.
Hammers, Pneumatic
* Ingersoll-Rand Co.
Hangers, Shaft
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Foundry & Machine Co.
* Wood's, T. B. Sons Co.
Hangers, Shaft (Ball and Roller Bearing)
* Jones, W. A. Fdry. & Mach. Co.
* S K F Industries (Inc.)
Hard Rubber Products
United States Rubber Co.
Hardening
* American Metal Treatment Co.
Heat Treating
* American Metal Treatment Co.
Heaters, Feed Water (Closed)
* Brownell Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n
Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n
Heaters, Water Supply
Herbert Boiler Co.
Heaters, Water Supply (Garbage Burner)
Herbert Boiler Co.
Heaters & Mixers, Water, Instantaneous
Manufacturing Equipment & Engrg. Co.
Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.
* Erie City Iron Works
* H.S.B.W.-Cochrane Corp'n
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n
Heaters and Purifiers, Feed Water Metering
* H.S.B.W.-Cochrane Corp'n
Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
Clarage Fan Co.
Heating Specialties
* Fulton Co.
Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Hoisting Outfits
Novo Engine Co.
Hoists, Air
* Ingersoll-Rand Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corp'n
Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n
Hoists, Electric
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Electric Crane & Hoist Co.
Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.
Novo Engine Co.
Western Machinery Co.
Hoists, Head Gate
Smith, S. Morgan Co.
Hoists, Locomotive & Coach
Whiting Corp'n
Hoists, Mine
Lidgerwood Mfg. Co.
Novo Engine Co.
Western Machinery Co.
Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Hoists, Steam
(See Engines, Hoisting)
Holders, Nipple
Curtis & Curtis Co.
Hose, Acid
United States Rubber Co.
Hose, Air and Gas
Goodrich, B. F. Rubber Co.
United States Rubber Co.
Hose, Fire
United States Rubber Co.
Hose, Gas
United States Rubber Co.
Hose, Gasoline
Goodrich, B. F. Rubber Co.
United States Rubber Co.
Hose, Metallic
* Johns-Manville (Inc.)
Hose, Oil
United States Rubber Co.
Hose, Steam
United States Rubber Co.
Hose, Suction
United States Rubber Co.
Hose, Water
Goodrich, B. F. Rubber Co.
United States Rubber Co.
Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n
Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n
Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Worthington Pump & Machinery Corp'n
Hydraulic Machinery
* Allis-Chalmers Mfg. Co.
Hydraulic Press Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n
Hydraulic Rams, Presses, Turbines, etc.
(See Rams, Presses, Turbines, etc., Hydraulic)
Hydrokineters
* Schutte & Koerting Co.
Hydrometers
Taylor Instrument Cos.
Hygrometers
Taylor Instrument Cos.

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
Ice Tools
* Gifford-Wood Co.
Idlers (Lenix)
* Smidth, F. L. & Co.
Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
Indicators, CO
* Uehling Instrument Co.
Indicators, CO_2
Bacharach Industrial Instrument Co.
Brinckerhoff, H. Gordon Co.
* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.
Indicators, Engine
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Indicators, SO_2
* Uehling Instrument Co.
Indicators, Speed
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.
Injectors
* Lunkenheimer Co.
* Schutte & Koerting Co.
Instruments, Electrical Measuring
* General Electric Co.
Taylor Instrument Cos.
Weston Electrical Instrument Co.
Instruments, Recording
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Brinckerhoff, H. Gordon Co.
* Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* General Electric Co.
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.
Instruments, Scientific
Taylor Instrument Cos.
Instruments, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.
Insulating Materials (Electric)
* General Electric Co.
* Johns-Manville (Inc.)
Insulating Materials (Heat and Cold)
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.
Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
* Lunkenheimer Co.
United States Rubber Co.
* Wheeler, C. H. Mfg. Co.
Joints, Flanged Pipe
* Crane Co.
Joints, Flexible
* Barco Mfg. Co.
Joints, Swing and Swivel
* Barco Mfg. Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.
Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.
* Titusville Iron Works Co.
Keys, Machine
* Whitney Mfg. Co.
Keyseating Machines
* Whitney Mfg. Co.
Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Ladles
Northern Engineering Works
Whiting Corp'n.
Lamp Protectors
Flexible Steel Lacing Co.
Lamps, Incandescent
* General Electric Co.
* Johns-Manville (Inc.)
Land-Clearing Machinery
Clyde Iron Works Sales Co.
Lathe Attachments, Pipe-Threading
Curtis & Curtis Co.
Lathes, Automatic
* Jones & Lamson Machine Co.
Lathes, Brass
* Warner & Swasey Co.
Lathes, Chucking
* Jones & Lamson Machine Co.
Lathes, Engine
* Builders Iron Foundry
Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.
Levers, Flexible (Wire)
* Gwilliam Co.
Lightning Arresters
* General Electric Co.
Linings, Brake
* Johns-Manville (Inc.)
Linings, Furnace
* Best, W. N. Furnace & Burner Corp'n
Brinckerhoff, H. Gordon Co.
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
McLeod & Henry Co.
* Quigley Furnace Specialties Co.
Linings, Stack
* Johns-Manville (Inc.)
Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n
Loaders, Portable
Link-Belt Co.
Loaders, Wagon
* Gifford-Wood Co.
Link-Belt Co.
Lockers, Metal
Manufacturing Equipment & Engrg. Co.
Locomotives, Electric
* General Electric Co.
Locomotives, Storage Battery
* General Electric Co.
Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Lubricants
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.
Lubricating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.
Lubricators, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.
Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.

Machine Work
Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Lammert & Mann Co.
Link-Belt Co.
Purvis Machine Co.
Machinery
(Is classified under the headings descriptive of character thereof)
Manometers
Bacharach Industrial Instrument Co.
* Simplex Valve & Meter Co.
Mechanical Draft Apparatus
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.
Mechanical Stokers
(See Stokers)
Metal Cutting Machines
(See Cutting-off Machines, Metal)
Metal Equipment
Manufacturing Equipment & Engrg. Co.
Metal Reclaiming Mills
(See Mills, Metal Reclaiming)
Metal Treating
* American Metal Treatment Co.
Metals, Bearing
* General Electric Co.
Metals, Perforated
* Hendrick Mfg. Co.
Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
Meters, Boiler Performance
* Bailey Meter Co.
Meters, Condensation
* Simplex Valve & Meter Co.
Meters, Electric
* General Electric Co.
Weston Electrical Instrument Co.
Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* Precision Instrument Co. (Inc.)
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Types. Modern Gas Producers (Les gazogènes actuels). Ouvrier Moderne, vol. 5, no. 9, Dec. 1922, pp. 355–357, 3 figs. Describes various types and their operation; choice of fuels.

GEARS

Bevel. Bevel Gear Calculations, C. R. M. Moore. Machy. (Lond.), vol. 21, no. 534, Dec. 21, 1922, pp. 370–372, 3 figs. Study of alternative methods.

Design. Some Present-Day Steering Gears. Automobile Engr., vol. 12, no. 171, Dec. 1922, pp. 405–409, 10 figs. Outline of certain design points as evidenced at recent shows.

Involute, Testing. Testing Involute Spur Gears, M. Estabrook. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 32–34, and 81, 14 figs. Describes Saurer gear-testing machine, a Swiss development by means of which accuracy of tooth curves, spacing, and eccentricities can be determined with high degree of precision; and odontmeter, American instrument for quickly and accurately testing gears for tooth curves and spacing, and with which it is possible to locate troubles in machines or tools. (Abridged.)

Oil Transmission, Variable-Speed. Variable Speed Oil Transmission Gear. Engineering, vol. 114, no. 2973, Dec. 29, 1922, pp. 800–801, 15 figs. partly on p. 804. Details and various applications of gear constructed by Oilgear Co., Milwaukee, Wis.

Spiral Drive. Spiral Driving, C. S. Petitt. Machy. (Lond.), vol. 21, no. 535, Dec. 28, 1922, pp. 393–396, 6 figs. Study of arc of contact, and broad formulation of ideal conditions for continuous spiral drive.

Spur. Spur Gears, J. W. Snarry. Automobile Engr., vol. 12, no. 171, Dec. 1922, pp. 393–396, 8 figs. Considerations in selection of pitch, pressure angles, and tooth proportions.

Teeth, Strength of. Strength of Internal Spur-gear Teeth, A. Fisher. Machy. (Lond.), vol. 21, no. 532, Dec. 7, 1922, pp. 309–310, 3 figs. Discussion of certain geometrical relationships in tooth contact conditions upon which writer arrives at different conclusions from D. T. Hamilton, whose article was published in same journal, Oct. 19, p. 84.

GLUE

Manufacture. Utilisation of Bones and manufacture of Glue, E. Herrndorf. Eng. Progress, vol. 3, no. 12, Dec. 1922, pp. 263–266, 7 figs. Preparation of bones and extraction of fat; further treatment of bones up to extraction of glue; manufacture of glue; glue in cakes.

GRINDING MACHINES

Cylinder. Grinding Large Cylinders. Machy. (N. Y.), vol. 29, no. 5, Jan. 1923, pp. 347–348, 2 figs. Describes cylinder-grinding machine made by German firm and its use for regrinding steam cylinder for a Worthington duplex hydraulic pump.

H

HANDLING MATERIALS

Factories. Evolution in Shop Material Handling, L. S. Love. Iron Age, vol. 111, no. 3, Jan. 18, 1923, pp. 205–208, 9 figs. Practice at Yale & Towne Mfg. Co.'s plant at Stamford, Conn. Evolution from trolley and hand truckers to electric shop trucks and trailers.

Liquids. Appliances for Moving Liquids in Chemical Plants, A. K. Fischer. Chem. Age, (N. Y.), vol. 30, nos. 11, and 12, Nov. and Dec. 1922, pp. 501–504 and 547–550, 34 figs. Application of siphon and air-jet lift; pneumatic displacement, diaphragm and rotary pumps and their use in chemical manufacture.

Open-Hearth Works. Transport Installations in Open-Hearth Steel Works with Special Regard to Costs of Handling Materials (Transportanlagen in Siemens-Martin-Stahlwerken unter besonderer Berücksichtigung der Kosten der Materialbewegung), Hans Fromm. Stahl u. Eisen, vol. 42, nos. 47 and 49, Nov. 23 and Dec. 7, 1922, pp. 1737–1742 and 1809–1815, 22 figs. Discusses various possibilities of moving material in modern open-hearth works; determination of percentage of total production costs expended for conveyance of material shown on concrete example.

Packing and Weighing Machinery. Modern Packaging Machinery. Indus. Management (Lond.), vol. 8, no. 11, Dec. 14, 1922, pp. 346–348, 4 figs. Pneumatic system of packing and weighing.

HEAT TRANSMISSION

Boilers. The rate of Combustion, Heat-Transfer Coefficient and the Nature of Heat Transmission through Radiation and Contact (Ueber Brenngeschwindigkeit, Wärmedurchgangzsahl und über Wesen der Wärmeübertragung durch Strahlung und Berührung), W. Viebahn. Wärme, vol. 45, no. 27, July 14, 1922, pp. 333–335, 2 figs. Points out that heat transmission in boilers is augmented by high rate of combustion due to radiation and contact, cause of which is explained and an hypothesis set up.

Experiments. Cooling of a Plane Wall by Means of a Current of Air (Die Kühlung einer ebenen Wand durch einen Luftstrom), Wilhelm Nusselt and Walter Jürges. Gesundheits-Ingenieur, vol. 45, no. 52, Dec. 30, 1922, pp. 641–642, 2 figs. Results of experiments carried out to determine the amount of heat given off by a plane surface at various air velocities.

Heat Flow in a Finite Cylinder Having Variable Surface Temperature, George E. Thompson. Physical Rev., vol. 20, no. 6, Dec. 14, 1922, pp. 601–606, 2 figs. Derives equations of heat flow into finite circular cylinders when surface temperature is changed either suddenly or at uniform rate.

HEAT TREATING

City Gas for. Gas Useful in Heat Treating Room, J. Weaver Smith. Am. Soc. for Steel Treating—Trans., vol. 3, no. 4, Jan. 1923, pp. 396–414, 44 figs. Discusses practical application of city gas or manufactured gas in heat-treating room; convenience of using gas as fuel and its wide application to all types of industrial heating; burner and furnace design and effects of using equipment of improper design.

HEATING AND VENTILATION

Bureau of Engraving and Printing. Heating and Ventilating the Bureau of Engraving and Printing, Nelson S. Thompson. Am. Soc. Heating & Vent. Engrs. Jl.—vol. 29, no. 1, Jan. 1923, pp. 1–8, 5 figs. Simplicity of design marks systems used in world's largest printing plant.

Humidity in Residences. Humidity Requirements for Residences, A. P. Kratz. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 1, Jan. 1923, pp. 14–18, 5 figs. Questions answered relative to degree of humidity necessary and methods of supplying it.

HEATING, ELECTRIC

Industrial. Big Strides Made in Industrial Electric Heating, J. L. McK. Yardley. Elec. World, vol. 81, no. 1, Jan. 6, 1923, pp. 33–35, 2 figs. Applications of industrial electric ovens and heat-treating equipment extending; electric steam boilers for special service.

HELICOPTERS

Captive. Will Captive Helicopters Replace the Observation Balloon? Aerial Age, vol. 16, no. 1, Jan. 1923, pp. 9–11, 3 figs. Flight of 1 hr. with Kármán-Zurovec machine; advantages claimed in artillery adjustment; flights.

HOISTING MACHINERY

Electric Control. Electric Control of Hoisting Apparatus (Commande électrique des apparails de levage), M. Bizot. Electricien, vol. 54, no. 1315, Jan. 1, 1922, pp. 3–8, 6 figs. Its advantages as to distance control, change in speed, automatic control, etc.

HYDRAULIC MACHINERY

Aquapulsor Motor. The New Hydraulic Engine "Aquapulsor" (Die neue Wasserkraftmaschine "Aquapulsor"), R. Winkle. Glasers Annalen, vol. 91, no. 12, Dec. 15, 1922, pp. 185–191, 9 figs. Its behavior under different leads and varying head, and its use as tidal-power machine in coastal areas.

HYDRAULIC TURBINES

Development. Hydraulic Turbines (Turbinas Hydraulicas), Heman Greenwood. Revista Brasileira de Engenharia, vol. 4, no. 4, Oct. 1922, pp. 128–142, 27 figs. Discusses increase in capacity, reaction turbines for large heads, efficiency, distance control, high velocity for low heads, inverted and suction turbines.

Pelton Wheels. 26,000-Hp. Pelton Wheels of Societa Forze Idrauliche del Moncenisio, Constructed by Societa Construzioni Meccaniche Riva of Milan (Le turbine tipo Pelton da 26.000 hp. per l'impianto di Venaus della Societa Forze Idrauliche del Moncenisio, costruite dalla Societa Costruzioni Meccaniche Riva di Milano). Industria, vol. 36, no. 20, Oct. 31, 1922, pp. 382–386, 6 figs. Details of design and construction.

Tests. High-Speed Turbine Tests (Considerazioni ed esperimenti sulle turbine celeri), Alfredo Calzoni. Elettrotecnica, vol. 9, no. 27, Sept. 25, 1922, pp. 593–600, 18 figs. Water turbines for hydroelectric plants; construction of high-speed turbines following Buchi; particulars of tests carried out.

HYDRAULICS

Energy-Conversion Curve. The Triangular Chart and the Hydraulic Energy-Conversion Curve (Die Dreieckrechentafeln und die hydraulische Energieumwandlungskurve), Otto Laemann. Zeit. für angewandte Mathematik u. Mechanik, vol. 2, no. 5, Oct. 1922, pp. 375–380, 5 figs. Presents charts as schematic examples.

Hydrographic Investigations. Hydrographic Principles of the Swiss Water Supply (Hydrographische Grundlagen der Schweizerischen Wasserwirtschaft), Schweizerische Bauzeitung, vol. 80, nos. 19 and 20, Nov. 4 and 11, 1922, pp. 213–217 and 225–226, 24 figs. Graphic presentations of hydrometric observations. Deals with lake level fluctuations, and water flow in rivers. See also abstract of report of Federal Board of Water Supply, pp. 227–230 and 276–277 of same jl.

HYDROELECTRIC DEVELOPMENTS

Tasmania. Hydro-Electric Development in Tasmania, Fred. A. Talbot. Elec. Rev., vol. 91, nos. 2350 and 2351, Dec. 8 and 15, 1922, pp. 856–858 and 892–893, 5 figs. Comprehensive scheme for generation of 350,000 hp. from water power of which initial 58,000 hp. has been brought into service.

United States. Hydro Projects Will Total $778,300,000. Elec. World, vol. 81, no. 1, Jan. 6, 1923, pp. 37–38, 1 fig. Active applications filed with Federal Power Commission total 334, involving 17,692,109 primary hp.; projects involving 2,531,489 primary hp. now under construction.

HYDROELECTRIC PLANTS

Austria. The Lower Austrian Electricity Company (NEWAG) [Die n.-ö. Elektrizitätswirtschafts A. G. ("NEWAG")], Anton Strasser. Elektrotechnik u. Maschinenbau, vol. 40, no. 50, Dec. 10, 1922, pp. 581–585. Details of some of their 13 power plants, including electrical equipment and operation generally.

Automatic. Automatic Hydroelectric Plant, C. E. von Sothen. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 88–89, 2 figs. Automatic control of small hydroelectric plant at Newton Falls Paper Co. enables water to be used economically.

France. Electric Power Station and Barrage Dam Near Belle-Isle-en-Terre (Usine électrique installée dans un barrage près de Belle-Isle-en-Terre). Génie Civil, vol. 81, no. 24, Dec. 9, 1922, pp. 529–532, 17 figs. Describes multiple-arch reinforced-concrete dam at Leguer River, forming one structure with works containing turbines, alternators, transformers, etc.

Italy. The New Calcinere Power Station (La nuova centrale di Calcinere), Felice Goffi. Ingegneria, vol. 1, no. 6, Dec. 1, 1922, pp. 143–144, 10 figs. partly on supp. plate. Discusses water power, pressure conduits, transmission lines and poles, etc.

Municipal. Small Municipal Hydro-Electric Plant in Tennessee, Eng. News-Rec., vol. 89, no. 25, Dec. 21, 1922, pp. 1076–1078, 6 figs. Cookeville installs 450-kw. station with concrete dam and long wood-pipe line crossing river on suspension bridges.

Northern Europe, Practice in. Hydraulic Power Plant Practice in Northern Europe, Clifford N. Anderson. Elec. World, vol. 81, no. 2, Jan. 13, 1923, pp. 91–96, 8 figs. Skeptical regarding outdoor installations; connecting generators and transference directly; higher reactance and regulators; oil circuit breakers with multi-contacts and explosion chambers.

Small, System for. New Small Hydroelectric Plants (Neue Klein-Wasserkraftanlagen), C. Reindl. Elektrotechnische Zeit., vol. 43, no. 49, Dec. 7, 1922, pp. 1449–1451, 5 figs. Describes new system developed by author for d.c. installations with hydraulic-turbine drive, which is said to effect saving of 50 per cent in cost of installation and to require no attendance.

Switzerland. The Fully Hydroelectric Plant (Switzerland) (Die Wasserkraftanlage Fully), H. Chenaud and L. Dubois. Schweizerische Bauzeitung, vol. 80, nos. 22, 23, 24, 25, 26 and 27, Nov. 25, Dec. 2, 9, 16, 23 and 30, 1922, pp. 247–252, 259–261, 267–268, 272–276, 279–281 and 297–298, 35 figs. Single-stage high-pressure plant working under head of 1650 m. Description of plant and construction details, including transport installations, dam wall, water-supply works, pumping plant, pressure line, engine house, turbines and turbine regulators.

The Fully Hydro-Electric Power Station, Switzerland. Engineering, vol. 114, nos. 2969, 2970 and 2972, Nov. 24, Dec. 1 and 15, 1922, pp. 635–639, 665–670 and 731–734, 99 figs. partly on supp. plates. Works under head of 5145 ft., probably highest working head ever utilized. Detailed description of construction and problems involved.

I

IGNITION

Electric-Arc. Modern Arc Ignition (Die moderne Lichbogentzündung), Hermann Mertz. Motor u. Auto, vol. 19, no. 20–21, Nov. 15, 1922, pp. 257–263, 16 figs. Low-tension and high-tension sparking; describes types of electric ignition for automobiles, including Bosch.

High-Tension Apparatus. The Duty of High-Tension Ignition Apparatus, J. D. Morgan. Automobile Engr., vol. 12, no. 171, Dec. 1922, pp. 413–415, 6 figs. Describes high-tension spark; high-tension spark as igniting agent; plug insulation leakage; utility test.

INDUSTRIAL MANAGEMENT

Administrators, Training of. Training for Administration in Industry, H. Riall Sankey. Jl. Indus. Administration, vol. 2, no. 14, Nov.-Dec. 1922, pp. 35–47. Work of Inst. of Indus. Administration and its aspirations. Training and education of administrators.

Cost Control, Textile. Textile Cost Control, Henry C. Haskell. Management Eng., vol. 4, no. 1, Jan. 1923, pp. 57–59. Effort to simplify cost accounting and production planning.

Graphical Efficiency Study. The Graphical Study of Operating Efficiency, A. R. Blakey. Chem. & Met. Eng., vol. 27, no. 26, Dec. 27, 1922, pp. 1259–1261, 2 figs. System of graphs developed to analyze labor costs, and which reveal lack of smoothness in operating and causes for lost time.

Money Economy, Production and. Making Goods and Making Money, Wesley C. Mitchell. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 4–6. Points out that among improvements needed are methods of stabilizing monetary standard, controlling business cycle, allowing production to be organized in units large enough to attain maximum industrial efficiency while safeguarding community against high prices, etc. Discussion, pp. 10–13.

Planning. Factory Planning, H. E. Taylor. Machy. (Lond.), vol. 21, no. 532, Dec. 7, 1922, pp. 289–297, 11 figs. Survey of systems of shop planning for various methods of production. Paper read before Inst. Production Engrs.

Plant Maintenance. Maintenance Engineering in Large Industrial Plants, Samuel E. Bird. Eng. News-Rec., vol. 89, no. 26, Dec. 28, 1922, pp. 1106–1108. Organization and work of department for inspection and upkeep of buildings, equipment, yards, tracks and roadways.

Production Costs. Calculating the Cost of Production (Etablissement du Prix de revient de Fabrication), Danty Lafrance. Vie Technique et Industrielle, vol. 4, no. 38, Nov. 1922, pp. 83–89, 6 figs.

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co
* Builders Iron Foundry
* General Electric Co
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* National Meter Co
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co

Mills, Grinding
* Smidth, F. L. & Co

Mills, Sheet and Plate
Mackintosh-Hemphill Co

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co

Mills, Tube
* Allis-Chalmers Mfg. Co
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co
* General Electric Co.
* Ridgway Dynamo & Engine Co.

Motors, Electric
* Engberg's Electric & Mech. Wks
* General Electric Co
Master Electric Co.
* Shepard Electric Crane & Hoist Co.

Motors, Synchronous
* Ridgway Dynamo & Engine Co

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co

Non-Return Valves
(See Valves, Non-Return)

Nozzles, Aerating
* Spray Engineering Co

Nozzles, Blast
* Schutte & Koerting Co

Nozzles, Sand and Air
* Lunkenheimer Co

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co
* Spray Engineering Co

Nuts, Machine Screw (Steel & Brass)
* Reed & Prince Mfg. Co

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Lunkenheimer Co.

Oil and Grease Guns
* Royersford Foundry & Machine Co

Oil Burners, Engines, Filters, Pumps, Separators, etc.
(See Burners, Engines, Filters, Pumps, Separators, etc., Oil)

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Improved Equipment Co.
* Schutte & Koerting Co.
Todd Shipyards Corp'n

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Tanks
* Scaife, Wm. B. & Sons Co.

Oil Well Machinery
* Brownell Co
* Ingersoll Rand Co
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Oilers, Sight Feed
* Lunkenheimer Co.

Oiling Devices
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co

Oiling Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co

Oils, Fuel
Texas Co

Oils, Lubricating
Texas Co.
Vacuum Oil Co

Ore Handling Machinery
* Brown Hoisting Machinery Co
Link-Belt Co.

Ovens, Core
Whiting Corporation

Overhead Track System
(See Tramrail Systems, Overhead)

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
Linde air Products Co.

Packing, Ammonia
France Packing Co
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Packing, Asbestos
Goodrich, B. F. Rubber Co.
* Johns-Manville, Inc
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co
Goodrich, B. F. Rubber Co.
* Johns-Manville, Inc
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co
Goodrich, B. F. Rubber Co.
* Jenkins Bros
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Packing, Rubber
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)

Packing, Sheet
* Goetze Gasket & Packing Co.
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Paint, Metal
* General Electric Co.
* Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paper Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
DuPont Engineering Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
Dixon, Joseph Crucible Co.
Keuffel & Esser Co.

Penstocks
Smith, S. Morgan Co.

Perforated Metals
(See Metals, Perforated)

Petroleum Products
Texas Co.

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* United States Cast Iron Pipe & Fdry Co.
Weatherly Foundry & Mfg. Co

Pipe Cutting-off Machines
Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Pipe Joint Clamps
(See Clamps, Pipe Joint)

Pipe, Riveted
* American Spiral Pipe Wks.
* Titusville Iron Works Co
* Walsh & Weidner Boiler Co.

Pipe, Riveted Steel
* Springfield Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe, Welded
* American Spiral Pipe Wks.
* Crane Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings etc., Pipe)

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co
Dietzgen, Eugene Co.
Keuffel & Esser Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Plate Metal Work
(See Steel Plate Construction)

Pneumatic Tools, Tubes, etc.
(See Tools, Tubes, etc., Pneumatic)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Foundry & Machine Co

Poppet Valve Engines
(See Engines, Steam, Poppet Valve)

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Morse Chain Co.
Poole Engrg. & Mch. Co.
* Royersford Foundry & Machine Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
Philadelphia Drying Machinery Co.

Presses, Blanking
* Bliss, E. W. Co.

Presses, Draw
* Bliss, E. W. Co.

Presses, Extruding
* Bliss, E. W. Co.

Presses, Foot
* Bliss, E. W. Co.
* Royersford Foundry & Machine Co.

Presses, Forging
* Bliss, E. W. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Machinery Co.

Presses, Punching and Trimming
* Bliss, E. W. Co.
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Presses, Sheet Metal Working
* Bliss, E. W. Co.

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Worthington Pump & Machy Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Machine Co.
Link-Belt Co.
* Medart Co.
Wood's, T. B. & Sons Co.

Pulleys, Iron
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
Kenworthy, Chas. F. (Inc.)

Pulverized Fuel Feeders
(See Feeders, Pulverized Fuel)

Pulverizers
Brown, A. & F. Co.
* Fuller Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc., Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Outfits
Novo Engine Co.

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Titusville Iron Works Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.

Conditions in manufacture on a large scale, with interchangeable parts; records required regarding labor, material, machines, inspection, etc., and their use in arriving at cost of production.

Quality Control. Quality Production in Manufacturing, Luther D. Burlingame. Management Eng., vol. 4, no. 1, Jan. 1923, pp. 33–40, 10 figs. How secured and how maintained.

Wastes. Factory Management Wastes, J. F. Whiteford. Jl. Indus. Administration, vol. 2, no. 14, Nov.-Dec. 1922, pp. 55–61. Discusses preventable wastes under following heads: (1) imperfect design; (2) inadequate production control; (3) ineffective coördination of sales and production sections; (4) inaccurate costs and statistics; (5) improper working conditions; and (6) incompetent personnel.

INDUSTRIAL ORGANIZATION

Departmental. Some Aspects of Departmental Organization, A. H. Railing. Jl. Indus. Administration, vol. 2, nos. 13 and 14, Oct. and Nov.-Dec. 1922, pp. 3–8 and 48–54. Comparison with state government; functions of business organization; meeting changes in conditions; raw-material, planning, labor and overhead costs; specialization, sales expenses; comparison of types and examples of organizations; the Gen. Elec. Co.'s organization, decentralization.

Omnibus Repair Works. Industrial Organization in Public Services. Indus. Management (Lond.), vol. 8, no. 11, Dec. 14, 1922, pp. 349–352, 1 fig. Deals with new central overhaul works of London Gen. Omnibus Co., at which more than 3000 motor omnibuses are overhauled and repaired in a year.

INDUSTRIAL RELATIONS

Human Problem. The Human Problem in Industry, E. M. Herr. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 6–10. According to author, shop representation, fair wages, security of employment, and means for education are among demands for workers and merit consideration of all managers. Discussion, pp. 10–13.

INDUSTRY

France, Reconstruction in. French Industrial Reconstruction and How It Has Been Accomplished, Arthur L. Greene and Henry Obermeyer. Am. Mach., vol. 58, no. 3, Jan. 18, 1923, pp. 107–111, 7 figs. Details of reconstructing plant of a Lille machine company after war and its part in reconstructing other industries; 30 new types of machines developed.

INSULATORS, HEAT

Properties of. Heat Insulating Materials, W. Newton Booth. Gas Jl., vol. 160, no. 3111, Dec. 27, 1922, pp. 795–799, 1 fig. Physical properties of common insulating materials are given in tabular form.

INTERNAL-COMBUSTION ENGINES

Doxford. The Doxford 3,000-Hp. Engine of the Cargo Boats Ynguren and Eknaren (Les moteurs, système Doxford, de 3,000 chevaux, des cargo-boats "Ynguren" et "Eknaren"). Génie Civil, vol. 81, no. 25, Dec. 16, 1922, pp. 553–558, 18 figs. Design and operation; two opposed pistons in each cylinder, giving double power; 2-stroke, 4-cylinder, 77 r.p.m.

Ripert. The Ripert Engine (Le moteur Ripert), Grison. Bul. Technique du Bureau Veritas, vol. 4, no. 10, Oct. 1922, pp. 245–247, 2 figs. A two- and four-stroke engine endeavoring to rectify some of the weak points of the Diesel; gets charge ready before dead-center and has instantaneous combustion; production of maximum pressure.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES.]

IRON

Corrosion. Parkerizing, A Combined Rust-Proofing and Finishing Process, L. E. Eckelmann. Raw Material, vol. 5, no. 11, Dec. 1922, pp. 438–439, 2 figs. Description of process and its applications.

Electrolytic. The Production of Electrolytic Iron Using Pyrite as Raw Material, F. A. Eustis. Min. & Met. Soc. of Am.—Bul. no. 157, vol. 15, no. 5, Dec. 1922, pp. 152–160 and (discussion) 160–168, 3 figs. Describes Eustis process directed broadly to treatment of iron ores with or without other metals, to recover pure iron directly by electrolysis; in most of its applications it yields one or more by-products.

IRON ALLOYS

Preparation and Properties. Preparation and Properties of Pure Iron Alloys: I. Effects of Carbon and Manganese on the Mechanical Properties of Pure Iron, Robert P. Neville and John R. Cain. U. S. Bur. of Standards, Sci. Papers, vol. 18, no. 453, Oct. 16, 1922, pp. 411–443, 16 figs.

IRON AND STEEL

British Columbia. An Iron and Steel Industry For British Columbia, Robert Dunn. Can. Min. Jl., vol. 43, no. 52, Dec. 29, 1922, pp. 896–897. Resumé of optimistic report by C. P. Williams on economic possibility of establishing an iron and steel industry in British Columbia.

Magnetic Properties. Investigation on the Magnetic Transformation of Iron and Steels (Etude expérimentale sur les transformations magnétiques du fer et des aciers), P. Dejean. Annales de Physique, vol. 18, no. 9, Sept.-Oct. 1922, pp. 171–272, 52 figs. Loss of magnetic properties at high temperatures; results of experiments carried out on ferromagnetic and paramagnetic phenomena. Bibliography.

IRON CASTINGS

Acid Resisting. Some Casting Problems of Acid-Resisting Irons, John Longden. Foundry Trade Jl., vol. 26, no. 329, Dec. 7, 1922, pp. 466–470, 12 figs. Notes on composition of alloy; physical characteristics; melting practice; graphite separation; different behavior from different cupolas; theoretical desiderata; carbon in liquid iron; types and problems of casting.

Chilled-Casting Rolls. The Scientific Principles Governing the Production of Chilled-Casting Rolls (Ueber die wissenschaftlichen Grundlagen zur Herstellung von Hartgusswalzen), Emil Schuz. Stahl u. Eisen, vol. 42, nos. 43, 48 and 52, Oct. 26, Nov. 30 and Dec. 28, 1922, pp. 1610–1617, 1773–1781 and 1900–1906, 22 figs. Requirements of such rolls; paper and metal rolls; construction methods; process of cooling; heat relations between rolls and ingot molds; contraction of chilled-casting rolls; casting stresses and temperatures; chemical composition of separate parts; metallographic investigations. Photomicrographs.

Gating and Feeding. Gating, Feeding and Casting, E. Longden. Foundry Trade Jl., vol. 26, nos. 329, 330 and 331, Dec. 7, 14 and 21, 1922, pp. 471–472, 489–490 and 509–512, 15 figs. Survey of peculiarities of gray cast iron and effect of various elements in reducing or increasing fluidity. Examples of faulty and successful gating and feeding methods.

Reversed Chilled. Reversed Chilled Gastings (Umgekehrter Hartguss), Bernhard Osmann. Giesserei-Zeitung, vol. 19, no. 50, Dec. 19, 1922, pp. 719–721, 4 figs. It is shown that sulphur is a factor in formation of reversed chill casting, but is not immediate cause thereof, it was due in particular case described to FeO content of the cast iron, which led to release of gas and consequent cooling.

IRON, PIG

Manufacture. Iron Making Economies Developed in 1922, F. H. Willcox. Iron Age, vol. 111, no. 1, Jan. 4, 1923, pp. 84–86. Feasibility of 700-ton-per-day plant; production of 7 tons per man; handling fine dust and utilizing scrap; selling surplus power.

Production. Machine Cast Pig Iron Increasing in Popularity. Can. Foundrymen, vol. 13, no. 12, Dec. 1922, pp. 13–15, 2 figs. Can. Furnace Co. installing machine at their Port Colborne furnace; review of old and new process; different people's opinions.

Sampling. American Methods of Sampling Pig-Iron. Foundry Trade Jl., vol. 26, no. 331, Dec. 21, 1922, pp. 515–516, 2 figs. Method used and published by Carnegie Steel Co.'s Bur. of Information, Pittsburgh, Pa.

L

LABOR

Legislation, 1921. Labor Legislation of 1921. U. S. Bur. of Labor Statistics, no. 308, July 1922, 328 pp. Review of legislation, and laws of various states enacted since Jan. 1, 1921.

Organization. Labor Unions and Slack Time (Les organisations ouvrières professionnelles et le chômage), G. Olphe Galliard. Vie Technique et Industrielle, vol. 4, nos. 37 and 38, Oct. and Nov. 1922, pp. 5–8 and 77–82. English trade unionism, organization and employment benefits; syndicalism or trade unionism in France, guarantees and payments to labor for slack time.

Organization of Mine Labor (Contributo allo studio sull'organizzazione scientifica del levero in miniera), Salvatore Fois. Rassegna Minetaria Metallurgica e Chimica, vol. 57, no. 5, Nov. 15, 1922, pp. 86–89. The various types of skilled and unskilled labor in mines, their grading, pay, promotion, etc.

Shortage. The Labor Shortage—Its Volume and Means of Relief. Eng. News-Rec., vol. 90, nos. 1 and 2, Jan. 4 and 11, 1923, pp. 8–13 and 62–65, 4 figs. Contains following articles: Jan. 4: Labor shortage in building trades. Immigration as affecting labor situation. Jan. 11: How building trades are training apprentices. Seasonal employment in building construction.

Two- vs. Three-Shift Day. Length of Work Periods on Continuous-Process Work in the Chemical Industries, Horace B. Drury. Jl. Indus. & Eng. Chem., vol. 15, no. 1, Jan. 1923, pp. 84–85. General situation with respect to shifts, particularly in chemical industries, and results which have followed where plants have changed from two to three shifts.

LABORATORIES

Aeronautical. Laboratories of the Aeronautical Technical Service (Les laboratories du Service Technique de l'Aéronautique), Robert. Aéronautique, vol. 4, no. 43, Dec. 1922, pp. 373–378, 4 figs. Describes new laboratories at Chalais-Meudon for aerodynamics, heat treatment, mechanical, chemical, and physical tests, photography, meteorology, and optics.

LATHES

Center. A New Center Lathe. Eng. Production, vol. 5, no. 115, Dec. 14, 1922, pp. 567–568, 3 figs. New Dean, Smith & Grace 12-in. high-speed gap lathe.

Tailstocks. Lathe Tailstocks. Eng. Production, vol. 5, no. 117, Dec. 28, 1922, pp. 608–610, 10 figs. Design of various types.

Turret. The Turret Lathe in the Railway Wagon Shop. British Machine Tool Engineering, vol. 2, no. 18, Nov.-Dec. 1922, pp. 553–556 and 568, 8 figs. Describes operations in production of car buffers for one of the large Indian railways, serving as good example to demonstrate capabilities of modern design of turret lathe.

LIGHTING

Luminaire Design. Tentative Code of Luminaire Design. Illuminating Eng. Soc.—Trans., vol. 17, no. 10, Dec. 1922, pp. 703–750, 48 figs. Prepared by Committee to coöperate with fixture manufacturers.

LIGNITE

German and American. German Brown Coal Compared With American Lignite, O. P. Hood. Chem. & Met. Eng., vol. 28, no. 2, Jan. 10, 1923, pp. 58–59, 1 fig. German is almost two-thirds water, and has 2½ to 13 per cent agglutinating matter; American is one-third water and has less than 1½ per cent agglutinating matter. See also Power, vol. 57, no. 2, Jan. 9, 1923, pp. 63–64, 1 fig.

LOCOMOTIVE BOILERS

Cole's Ratios, Graphic Presentation. Graphic Presentation of Boiler Proportions, C. A. Seley. Ry. Age, vol. 74, no. 2, Jan. 13, 1923, pp. 189–192, 19 figs. Diagrammatic method for showing at glance essential facts brought out by Cole's ratio. See also Ry. & Locomotive Eng., vol. 36, no. 1, Jan. 1923, pp. 9–13, 24 figs.

Manufacture. Locomotive Boiler Work in a Modern English Shop. Boiler Maker, vol. 22, no. 12, Dec. 1922, pp. 335–338, 5 figs. Equipment and methods employed at Elswick Works of W. G. Armstrong, Whitworth & Co., Ltd., England.

Proportions, Measuring. A New Measuring Stick for Locomotive Boiler Proportions, C. A. Seley. Ry. Rev., vol. 71, no. 26, Dec. 23, 1922, pp. 892–897, 24 figs. Graphical analysis of locomotive boiler proportions reveals science of thermic syphon.

Repairing Cracks in Tubeplates. Repairing Cracks in Copper Tube Sheets, A. Wrench. Boiler Maker, vol. 22, no. 12, Dec. 1922, pp. 349–351, 14 figs. Methods employed in British shops in making temporary and permanent locomotive boiler repairs.

LOCOMOTIVES

British Design. Recent Tendencies in British Locomotive Practice, E. C. Poultney. Ry. Mech. Engr., vol. 96, no. 12, Dec. 1922, pp. 677–682 and vol. 97, no. 1, Jan. 1923, pp. 9–12, 12 figs. Important designs; piston valve with relief and by-pass features; mechanical lubricator. Pacific-type locomotive of 3-cylinder and 4-cylinder types.

Consolidation. Powerful Consolidation Locomotive for L. & N. E. Ry. Mech. Engr., vol. 97, no. 1, Jan. 1923, pp. 7–8, 1 fig. Also Ry. & Locomotive Eng., vol. 36, no. 1, Jan. 1923, p. 8, 1 fig.; and Ry. Age, vol. 73, no. 26, Dec. 23, 1922, pp. 1197–1198, 1 fig. Unusually heavy weight and high tractive force with well-proportioned boiler are special features.

Design. How the Builder Views Trend in Locomotive and Car Design. Ry. Rev., vol. 71, no. 26, Dec. 23, 1922, pp. 897–902, 1 fig. Contains following articles: Some Recent Developments in Locomotive Construction, Grafton Greenough; Present Day Tendencies in Car Construction, E. R. Viberg. Papers read before Can. Ry. Club.

Developments 1922. Locomotives of 1922. Engineer, vol. 135, no. 3497, Jan. 7, 1923, pp. 4–6, 11 figs. partly on supp. plates. Review of new types, including Vincent Raven's electric locomotive, Gresley's Pacific express engine, Baltic tank engine, Ramsay condensing locomotive, Ljungström turbo-electric locomotive, and Sulzer Diesel-electric rail coach.

4-6-0. 4-6-0 Type Locomotive on Hungarian State Railways, Desider Ledacs Kiss. Ry. & Locomotive Eng., vol. 36, no. 1, Jan. 1923, pp. 1–5, 8 figs. With Brotan-boiler, loop water preheater and purifier of Pecz-Rejtö system.

French Industry. What Is Happening to the Locomotive Industry of France? Henry Obermeyer and Arthur L. Greene. Am. Mach., vol. 58, no. 2, Jan. 11, 1923, pp. 77–80, 3 figs. Existing on old orders, government patronage and hope; no new orders in sight; repairing locomotives after war service; hope in electrification.

Headlights, Electric. Standard Headlight Wiring on the Michigan Central. Ry. Elec. Engr., vol. 13, no. 12, Dec. 1922, pp. 405–409, 10 figs. Entire conduit and wiring systems may be easily removed without injury to any of the conductors. Describes turbo-generator, arrangement of exterior conduit on locomotive, conduit on tender, and wiring of locomotive and tender.

Internal-Combustion. Oil Locomotives for the Gold Coast. Engineer, vol. 134, no. 3494, Dec. 15, 1922, pp. 646–647, 4 figs. Locomotives driven by internal-combustion engines recently supplied to Gold Coast Colony for service on Takoradi Harbor scheme.

Mountain-Type. Passenger Locomotive Design Breaks Record for Size in 1922. Ry. Rev., vol. 72, no. 1, Jan. 6, 1923, pp. 26–33, 12 figs. Description of ten mountain-type locomotives delivered to Denver & Rio Grande West. R. R. and ten additional locomotives being built by Am. Locomotive Co. which exceed in tractive capacity any passenger locomotive previously designed.

Pacific-Type. New 3-Cylinder "Pacific" Type Express Locomotive, North Eastern Railway. Ry. Gaz., vol. 37, no. 23, Dec. 8, 1922, p. 751, 1 fig. Details of passenger locomotive designed by Vincent L. Raven.

Standardization of Parts. A Noteworthy Experiment in Standardizing Railroad Motive Power. Am. Mach., vol. 58, no. 3, Jan. 18, 1923, pp. 105–106. Outline of standardization program on D. T. & I. R. R.; applications of automobile experience.

Steam-Turbine. Ljungström Turbine (La locomotive à turbines Ljungström), R. Villers. Nature, no. 2536, Nov. 11, 1922, pp. 312–316, 5 figs. Steam production, condensing, steering and reversing gears.

CLASSIFIED LIST OF MECHANICAL EQUIPMENT (Continued)

FOR ALPHABETICAL INDEX, SEE PAGE 132

Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
* Morris Machine Works.
Novo Engine Co.
Taber Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
Novo Engine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works.
* Worthington Pump & Machinery Corp'n

Pumps, Dry Vacuum
(See Pumps, Vacuum)

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Filter Press
Buffalo Steam Pump Co.
* Goulds Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring
Wayne Tank & Pump Co.

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Pumps, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lunkenheimer Co.
Novo Engine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Oil (Hand)
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Goulds Mfg. Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Novo Engine Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Novo Engine Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Morris Machine Works
* Smidth, F. L. & Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Morris Machine Works.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Punches, Metal Hand (Power)
* Parker-Kalon Corp'n

Punches, Multiple
* Bliss, E. W. Co.
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Punches, Power
* Bliss, E. W. Co.
* Royersford Fdry. & Mch. Co.

Punches and Dies
* Bliss, E. W. Co.
* Royersford Fdry. & Mch. Co.

Punching and Coping Machines
Long & Allstatter Co.

Punching and Shearing Machines
* Bliss, E. W. Co.
Long & Allstatter Co.
* Royersford Fdry. & Mch. Co.

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Elliott Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Superheater Co.
Taylor Instrument Cos.

Pyrometers, Optical
Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co.

Pyrometers, Radiation
Taylor Instrument Cos.

Racks, Machine, Cut
* Brownell Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdy. & Mch. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Railways, Industrial
Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recorders, CO
* Uehling Instrument Co.

Recorders, CO_2
* Uehling Instrument Co.

Recorders, SO_2
* Uehling Instrument Co.

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Refuse Destructors
(See Destructors, Refuse)

Regulators, Blower
* Davis, G. M. Regulator Co.

Regulators, Damper
* Fulton Co.
* Kieley & Mueller (Inc.)
* Parker-Kalon Corp'n

Regulators, Electric
* General Electric Co.

Regulators, Feed Water
Elliott Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co
* Schutte & Koerting Co.

Regulators, Humidity
* Fulton Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
* Fulton Co.
* General Electric Co.
* Kieley & Mueller (Inc.)
Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
Taylor Instrument Cos.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
Long & Allstatter Co.

Rivets (Steel, Brass & Copper)
* Reed & Prince Mfg. Co.

Roller Bearings
(See Bearings, Roller)

Rolling Doors and Shutters
(See Doors and Shutters, Steel or Wood, Rolling)

Rolling Mill Machinery
Mackintosh-Hemphill Co.

Rolls, Crushing
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Rolls, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
* Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
* Johns-Manville (Inc.)

Rope Drives
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rubber Goods, Mechanical
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
United States Rubber Co.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Saw Rigs, Portable
Novo Engine Co.

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Water Intake (Traveling)
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Cap & Set
Allen Mfg. Co.
* Reed & Prince Mfg. Co.

Screws, Cap & Set (Steel)
* Reed & Prince Mfg. Co.

Screws, Drive (Hardened)
* Parker Kalon Corp'n

Screws, Machine (Steel and Brass)
* Reed & Prince Mfg. Co.

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker-Kalon Corporation

Screws, Wood (Steel, Brass and Bronze)
* Reed & Prince Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Mchy. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Co.

Shafting, Flexible
* Gwilliam Co.

Shafting, Turned and Polished
Cumberland Steel Co.
Link-Belt Co.

Shapes, Brick
McLeod & Henry Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Sharpening Devices, Rock Drill
* Ingersoll-Rand Co.

Shears, Alligator
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Steam vs. Electric. Comparison of Steam and Electric Locomotives on Standard Gage (Note au sujet de la comparaison entre les locomotives à vapeur et les locomotives électriques sur les Chemins de Fer à voie normale), A. Chardin. Industrie des Tramways, Chemins de Fer et Transports Publics Automobiles, vol. 16, no. 191, Nov. 1922, pp. 234–239. Details of steam and electric equipment; critical review of advantages and disadvantages of each, from technical and traffic points of view.

Electric Locomotives and Motor Cars (Locomotivas electricas e carros motores), Ildeu Ramos Lima. Revista Brasileira de Engenharia, vol. 4, no. 5, Nov. 1922, pp. 271–286, 5 figs. Discusses electric and steam traction as used in various parts of world; systems of electrification, including the Chicago, Milwaukee & St. Paul; power consumption.

Superheater. Standard 2-10-0 Freight Locomotive for German Railways, Desider Ledacs Kiss. Ry. Rev., vol. 72, no. 1, Jan. 6, 1923, pp. 31–38, 8 figs. Three-cylinder superheater locomotive weighing 209,000 lb. develops 2000 hp. and 55,250 max. tractive effort.

Valve-Gear Links. Methods of Repairing Walschaert Valve Gear Links. Ry. Mech. Engr., vol. 96, no. 12, Dec. 1922, pp. 709–711, 8 figs. Operations systematized to permit quantity production of parts; jigs insure accuracy.

Tank. New Four-Couple Tank Locomotives (1-4-1) of the Italian State Railways (Nuove locomotive-tender a 4 assi accoppiati (1-4-1) delle Ferrovie dello Stato Italiano), Enrico Levi. Rivista Tecnica delle Ferrovie Italiane, vol. 22, no. 5, Nov. 15, 1922, pp. 317–321, 7 figs. partly on supp. plates. Details of new steam locomotives; tractive power 14,700 kg.; maximum speed 60 km.p.h.; carries 10,500 kg. water, 3,500 kg. coal.

LUBRICATING OILS

Purification and Reclamation. Getting Better Service From Lubricating Oils, Allen F. Brewer. Indus. Management (N. Y.), vol. 65, no. 1, Jan. 1923, pp. 13–18, 7 figs. Importance and methods of purification and reclamation.

Reclamation of Used Petroleum Lubricating Oils, Winslow H. Herschel and A. H. Anderson. U. S. Bur. of Standards, Technologic Papers, vol. 17, no. 223, Oct. 21, 1922, pp. 93–108. Deterioration of lubricating oils in use; present methods of reclamation; tests with motor oil purifier; organic acidity; interfacial tension; refining processes; cause of sludge formation.

M

MACHINE-TOOL INDUSTRY

Developments 1922. The Trend of the Machine Industry, Frank A. Scott. Iron Age, vol. 111, no. 1, Jan. 4, 1923, pp. 4–6. More specialization, yet general-purpose machines hold strong place; relation to automobile industry; problem of alloy steels.

Germany. Changed Machine Tool Shops of Germany, Godfrey L. Garden. Iron Age, vol. 111, no. 1, Jan. 4, 1923, pp. 33–34. Conditions at Ludwig Loewe Works, Berlin, as example; shortage in quantity and quality of expert men; technical training suffers.

Problems. Conditions Faced by Machine Tool Builder, J. J. Ralph. Iron Age, vol. 111, no. 2, Jan. 11, 1923, pp. 137–141, 7 figs. Why it is difficult to secure continuously satisfactory activity; how some of the problems have been met.

MACHINE TOOLS

Design and Uses. Machine Tools (Considerations générales sur les machines-outils). Outillage, vol. 6, nos. 37, 38, 39, 42, 43, 45, and 47, Sept. 16, 23, 30, Oct. 21, 28, Nov. 11 and 25, 1922, pp. 1218–1219, 1246–1247, 1278–1280, 1414–1415, 1447–1448, 1519–1521 and 1579–1582, 16 figs. Driving of machine tools and transmission of power; theory of tools and their construction; theory and application of cutting tools; speeds and feeds; metallurgy of tool steel, including carbon, special and high-speed steels, and their characteristics.

Development 1922. A Year's Achievement in Machine Tools, L. S. Love. Iron Age, vol. 111, nos. 1 and 2, Jan. 4 and 11, 1923, pp. 49–50 and 151–153. New measuring devices for accuracy; automatic movements replacing many hand operations. Standard types with automatic fixtures favored; multiple tooling and gearing used more extensively; improvements in threading methods.

Sine-Bar Attachment. A Universal Sine Bar Attachment, T. V. Greene. Machy. (Lond.), vol. 21, no. 536, Jan. 4, 1923, pp. 426–430, 14 figs. Mathematically exact machine settings obtained by direct measurement with standard outside micrometer.

MAGNESIUM

Castings. Magnesium Castings, Carl Irresberger. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 48–49. Discussion of magnesium and its alloys, together with practical data on casting articles from these metals and on physical properties of magnesium castings. Translated and abstracted from Giesserei Zeitung, vol. 19, no. 41, Oct. 17, 1922.

MALLEABLE IRON

Cupola Production. Cupola Malleable Production, C. C. Hermann. Foundry, vol. 50, no. 23, Dec. 1, 1922, pp. 952–955. Effects of constituents of charge and of different elements in metal; method for calculating charge; high annealing temperature.

Merits and Demerits. Malleable Iron, An "In Between" Product, William Romanoff. Raw Material, vol. 5, no. 11, Dec. 1922, p. 424, 2 figs. Sets forth various views regarding scope of merits and demerits.

Specifications. British Set Malleable Specifications. Iron Trade Rev., vol. 71, no. 25, Dec. 21, 1922, pp. 1701–1702, 1 fig. New specifications for malleable cast iron for admiralty purposes, issued by Brit. Cast Iron Research Assn.

MATERIALS

Inspection. The Inspection of Ferrous Materials, E. A. Allcut. Eng. Jl. (Eng. Inst. Can.), vol. 6, no. 1, Jan. 1923, pp. 13–18. Describes system of inspection together with methods of testing for various defects.

Properties. Some Properties of Materials and Their Use, J. M. Lessells. Ry. Mech. Engr., vol. 96, no. 12, Dec. 1922, pp. 683–685, 5 figs. Influence of investigations on design; allowable stresses should be based on true elastic limit.

Testing. The Material-Testing Station in the Automobile Plant of the Siemens-Schuckert Works (Die Materialprüfanstalt im Autowerk der SSW). H. Graefe. Siemens-Zeit., vol. 2, nos. 9 and 10, Sept. and Nov., 1922, pp. 405–411 and 620–630, 33 figs. Working methods and equipment in the different departments.

The Testing of Materials Used in the Manufacture of Electrical Equipment, C. Dawson. Instn. Elec. Engrs.—Jl., vol. 61, no. 313, Dec. 1922, pp. 59–64, 1 fig. Describes tests on metals and on insulating materials including sheet and molded insulation, oils and varnishes.

MEASURING INSTRUMENTS

Lubricating-Film. Optical Measuring Instruments for Determining the Thickness of the Oil Film on Bearings (Optische Messgeräte zur Bestimmung der Dicke der Oelschicht in Lagern unter Berücksichtigung der Anwendung auf Schmiermittel), V. Vieweg. Petroleum, vol. 18, no. 34, Dec. 1, 1922, pp. 1405–1412, 19 figs. Dry and fluid friction; economy of oil lubrication; influence of temperature; phenomena of lubricated bearings; viscosity of oil; microscopic examination.

METALS

Cold-Rolled, Heat Treatment of. The Heat Treatment of Cold Rolled Metal, Seymour Pile. Metal Industry (Lond.), vol. 21, no. 23, Dec. 8, 1922, pp. 529–531. Notes on method of manufacturing cold rolled metal, hardening and tempering, improving quality of metal, open counter arch muffle furnace, working temperature, heat treatment and cold work, removal of strains, etc.

Elastic Limit. Recent Researches on the Elastic Limit, Herman A. Holz. Am. Soc. for Steel Treating—Trans., vol. no. 4, Jan. 1923, pp. 367–385, 26 figs. Discusses properties of metals which are of vital importance in design of engineering structures; points out fallacies in use of elastic limit, proportional limit, yield point and maximum strength in design; practice of European engineers; latest type of extensometer as contrasted with those previously available. Stress-strain diagrams of various ferrous and non-ferrous metals.

Fatigue. The Fatigue of Metals, Leonard Bairstow. Beama, vol. 11, nos. 4, 5 and 6, Oct., Nov. and Dec. 1922, pp. 652–657, 731–737 and 811–818, 10 figs. Oct.: Notes on static tests; simple types of fatigue test. Nov.: Cases in which results of static and fatigue tests differ. Overstrain: effect on crystalline material. Dec.: Fatigue test as revealed by extensometer; fatigue for unequal tensile and compressive stresses; modern tests and testing appliances.

MICROSCOPES

Micro-Telescopes and Super. The 'Davon' Micro-Telescope and Super-Microscope, F. Davidson. Instn. Min. & Metallurgy—Bul., no. 218, Nov. 1922, pp. 1–5. New apparatus is said to bring telescope almost into microscopic uses and microscope somewhat into telescopic uses. Principle involved is application of short-focus telescope objective in a tube with series of diaphragms to microscope, microscope itself acting as compound eye-piece. See also Chem. News, vol. 125, no. 3270, Dec. 15, 1922, pp. 353–355.

MILLING

Locomotive Side Rods. Milling Locomotive Side-rods. Machy. (N. Y.), vol. 29, no. 5, Jan. 1923, pp. 385–387, 7 figs. Results of tests made to determine possibilities of reducing costs in railway shops by milling.

Power Required in. Power Required for Cutting Metal, Fred A. Parsons. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 35–41, 7 figs. Investigation extending over period of more than 10 years, for purpose of determining fundamental laws governing milling, turning, planing and drilling operations on various metals and alloys used in machine construction. Results are presented in shape of formulas and tables by means of which power required to machine metal in any given case may be calculated. (Abridged.)

MOLDING MACHINES

Turnover. Turnover Molding Machines, J. W. Smith. Eng. Production, vol. 5, no. 116, Dec. 21, 1922, pp. 595–596, 6 figs. Details of their construction and operation.

MOLDING METHODS

Dry-Sand. Dry Sand Molding for Small Work, J. D. Nicholson. Foundry Trade Jl., vol. 26, no. 330, Dec. 14, 1922, pp. 485–488, 12 figs. Methods of molding intricate and troublesome parts; recommendations to molders.

Gears. Templet Molding (Le Moulage au Trousseau en Fosse), E. Pouplin. Fonderie Moderne, no. 11, Nov. 1922, pp. 319–321, 5 figs. Describes operations in connection with molding a 55-tooth gear.

MOLDS

Steel vs. Cast-Iron. The Use of Steel Ingots as a Substitute for Gray Cast-Iron Molds (Zur Frage der Verwendung von Stahlkokillen statt Grauguss-formen), Fr. Schivetz. Stahl u. Eisen, vol. 42, no. 52, Dec. 28, 1922, pp. 1897–1900. Experiences with steel ingot molds; dimensions; chemical composition; method of molding and construction.

MOTORCYCLES

London Show. The Cycle and Motor-Cycle Show, Engineering, vol. 114, nos. 2970, 2971 and 2972, Dec. 1, 8 and 15, 1922, pp. 683–684 and 680, 705–707 and 734–736, 23 figs. Descriptions of exhibits.

N

NICKEL STEEL

Properties and Tests. Invar, Elinvar and Other Nickel Steels, Wallace Dent Williams. Raw Material, vol. 5, nos. 9, 10, and 11, Oct., Nov. and Dec. 1922, pp. 330–336, 372–381 and 428–437, 69 figs. Discusses history of invar and platinite patents and development of nickel steel, mechanical and magnetic properties, Brinell hardness tests and impact tests at various temperatures. Includes list of principal suppliers of high-nickel steels.

O

OIL ENGINES

Solid-Injection. Development of the Solid-Injection Oil Engine, H. F. Shepherd. Power, vol. 57, no. 3, Jan. 16, 1923, pp. 92–94, 4 figs. Development of the Crossley engine; the turbulence theory.

OIL FUEL

Burning Systems. Steam Raising by Liquid Fuel, J. H. Dyer. Roy. Engrs. Jl., vol. 36, no. 6, Dec. 1922, pp. 391–395, 5 figs. Oil-burning systems; choice of systems; details of installation; advantages of liquid fuel.

Efficient Handling. Conditions to Observe to get High Efficiency from Oil Fuel, Alberto Keenes. Inst. Mar. Engrs.—Trans., vol. 34, session 1922–23, Nov. 1922, pp. 199–208 and (discussion) 208–222. Deals with methods and conditions (together with reasons) of extracting greatest number of heat units for practical work.

OPEN-HEARTH FURNACES

Slide-Rule Calculations. Slide Rule for Open-Hearth Calculations, B. B. Russell, Jr. Iron Age, vol. 111, no. 3, Jan. 18, 1923, pp. 224–225, 3 figs. Allowances for various kinds of scrap and costs of delays; both sides of rule used; chart for making similar computations.

OXY-ACETYLENE CUTTING

Cast Iron. Principles of Oxyacetylene Fusion Welding, Alfred S. Kinsey. Ry. Mech. Engr., vol. 96, no. 12, Dec. 1922, pp. 716–718, 6 figs. Cutting cast iron.

Unusual Cast Iron Cutting Demonstration, R. C. Rohrbacher. Am. Welding Soc.—Jl., vol. 1, no. 11, Nov. 1922, pp. 43–44, 1 fig. Blast-furnace hearth-cooling plate 10 ft. high by 6 in. in thickness was cut in less than 2½ hours, at plant of large steel company; cut was made with plate in position.

OXY-ACETYLENE WELDING

Locomotive Fireboxes. Locomotive Fire-Box Welding, J. G. Gossman. Am. Welding Soc.—Jl., vol. 1, no. 11, Nov. 1922, pp. 44–47, 3 figs. Describes oxy-acetylene welding done on a locomotive firebox at large copper mining plant, after several unsuccessful efforts of repairing by various other means.

Pipe Lines. Oxy-Acetylene Welding as Applied to Oil Carrying Lines and Pumping Stations, N. E. Wagner. Am. Welding Soc.—Jl., vol. 1, no. 12, Dec. 1922, pp. 20–29. Fields for use of cutting and welding torch. Welding a 140-mi. pipe line; factors in pipe-line welding; repairing lines and breaks; storage-tank repairs.

P

PAINTS

Pigments, Microscopy of. Microscopy of Paint and Rubber Pigments, Henry Green. Chem. & Met. Eng., vol. 28, no. 2, Jan. 10, 1923, pp. 53–57, 11 figs. New conception of place of microscopy in examination of pigments involving distinct technique. Apparatus used in pigment study; characteristics of common pigments.

PAPER MANUFACTURE

Processes. Paper Manufacture, Especially Chemical Wood Pulp (Fabricacion del papel, especialment el de pulpa química). Sociedad de Fomento Fabriel—Boleton, vol. 39, nos. 8 and 9, Aug. and Sept. 1922,

Shears, Plate
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Shears, Squaring
* Bliss, E. W. Co.

Sheaves, Rope
Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheet Metal Working Machinery
* Bliss, E. W. Co.

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Sheets, Hard Rubber
Goodrich, B. F. Rubber Co.

Sheets, Rubber
Goodrich, B. F. Rubber Co.

Shelving, Metal
Manufacturing Equipment & Engrg. Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Sirens
(See Whistles, Steam)

Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Slitting Machines
* Bliss, E. W. Co.

Sluice Gates
(See Gates, Sluice)

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp, Wm & Sons Ship & Engine Bldg. Co.
DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
Lammert & Maun Co.
Mackintosh-Hemphill Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Poole Engrg. & Mch. Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Spray Nozzles
(See Nozzles, Spray)

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Fuller-Lehigh Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Engines, Separators, Superheaters, Traps, Turbines, etc.
(See Engines, Separators, Superheaters, Traps, Turbines, etc., Steam)

Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Sarco Co. (Inc.)

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.

Steel, Cold Rolled
* Union Drawn Steel Co.
Cumberland Steel Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Heine Boiler Co.
* Hendrick Mfg. Co.
* Keeler, E. Co.
* Titusville Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
* Union Drawn Steel Co.

Steering Engines
(See Engines, Steering)

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Stokers, Chain Grate
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
Green Engineering Co.

Stokers, Hand Operated
* McClave Brooks Co.

Stokers, Overfeed
* Detroit Stoker Co.
* McClave Brooks Co.
* Murphy Iron Works

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.

Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
Brinckerhoff, H. Gordon Co.
Heine Boiler Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.

Switches, Electric
* General Electric Co.

Synchroscopes
Weston Electrical Instrument Co.

Synchronous Converters
(See Converters, Synchronous)

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Tachometers
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Tachoscopes
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Tackle Blocks
(See Blocks, Tackle)

Tank Work
* Graver Corp'n

Tank Work (Air, Gas, Oil, Water)
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Heine Boiler Co.
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Tanks, Acid
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
* Graver Corp'n
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Brownell Co.
* Graver Corp'n
Heine Boiler Co.
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Machinery
* Franklin Machine Co.

Thermometers
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Thermometers, Distance
Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.

Thermostats
* Bristol Co.
* Fulton Co.
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co. (Inc.)

Tie Tamping Outfits
* Ingersoll-Rand Co.

Time Controllers
(See Regulators, Time)

Time Recorders
* Bristol Co.

Tipples, Steel
Link-Belt Co.

Tongs, Crane
Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Machinists' Small
* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
DuPont Engineering Co.

Torches, Hand
* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tractors, Turntable
Whiting Corp'n

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Electric Crane & Hoist Co.
Whiting Corp'n

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
Whiting Corp'n

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Treads, Stair (Rubber)
United States Rubber Co.

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n

Trolleys, Monorail
Whiting Corp'n

Tube Cleaners, Boiler
* Johns-Manville (Inc.)

Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.

Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Tubing, Rubber (Hard)
Goodrich, B. F. Rubber Co.

pp. 498–501 and 574–580, 8 figs. Describes sulphite and soda processes; bleaching with chlorine; beating and refining of pulp; use of casein; calenders; cutting, sorting and packing of paper.

Pulp Cooking. Mitscherlich Sulphite Pulp. Paper, vol. 31, no. 6, Nov. 29, 1922, pp. 7–8. How it differs from Ritter-Kellner quick cook sulphite pulp.

Seasonal Influences on Sulphite Cooking, Walter S. Haley. Paper, vol. 31, no. 6, Nov. 29, 1922, pp. 9–11. Methods and apparatus that work equally well in summer and winter.

PARACHUTES

Jumper. Greater Safety for the Parachute Jumper. Aviation, vol. 13, no. 25, Dec. 18, 1922, p. 811, 1 fig. Device to eliminate many of dangers of parachute landing.

PATTERNS

Storing. Patternshop Organisation, James Edgar. Metal Industry (Lond.), vol. 21, no. 22, Dec. 1, 1922, pp. 505–507, 3 figs. Finishing and storing patterns.

PLATES

Deflection of. The Theory of Plate Bending and Its Experimental Confirmation (Theorie der Plattenbiegung und ihre experimentelle Bestätigung), A. Nádai. Zeit. für angewandte Mathematik u. Mechanik, vol. 2, no. 5, Oct. 1922, pp. 381–398, 24 figs. Tests with glass and sheet-metal plates; notes on concrete plates.

PNEUMATIC TOOLS

Hammers. Pneumatic Tools (L'outillage pneumatique des Forges et Ateliers du Meudon). Société d'Encourgagment pour l'Industrie Nationale—Bul., vol. 134, no. 8, Aug.-Oct. 1922, pp. 839–846, 8 figs. Describes various kinds of pneumatic hammers made by Forges et Ateliers du Meudon, their construction and operation.

POWER PLANTS

Economic Design. Economic Design of Power Plants, H. Midgley. Beama, vol. 12, no. 6, Dec. 1922, pp. 786–792, 8 figs. Information on costing as affects design and concerns preparation of estimates.

Petroleum Refinery. New Plant at the Bayway Refinery. Power Plant Eng., vol. 27, no. 2, Jan. 15, 1923, pp. 109–117, 12 figs. Centralized control and combination coal and gas-fired boilers are features of particular interest.

Progress 1922. A Year of Progress in the Power-Plant Field. Power, vol. 57, no. 1, Jan. 2, 1923, pp. 2–18, 17 figs. Advances in steam pressure; intense interest in powdered coal; construction of large plants; previous records broken in size of steam turbines; hydroelectric units; transformers; and switching equipment.

POWER TRANSMISSION

Factors in. Some Factors in Power Transmission. Can. Machy., vol. 28, no. 26, Dec. 28, 1922, pp. 110–113 and 132, 7 figs. Installing lineshaft supports; figuring size of shaft; reducing friction by means of ball bearings.

PRESSES

Drawing, Electric Stop for. Electric Stop for Drawing Presses, George W. Wilder. Machy. (N. Y.), vol. 29, no. 5, Jan. 1923, pp. 345–346, 4 figs. Automatic electric stop designed for use on Farrel roll-feed double-action presses employed in production of screw shells such as are used on incandescent electric lamp bulbs and sockets.

PULVERIZED COAL

Boiler Firing. Pulverized Coal Firing (Le chauffage au charbon pulverisé des chaudières et des fours en general), Paul Frion. Chimie & Industrie, vol. 8, nos. 4 and 5, Oct. and Nov. 1922, pp. 736–757 and 974–988, 50 figs. Analogy with combustion of gas; describes pulverizing plants of various types; feeding into burners; using low-grade fuel; pneumatic conveying, applications, drawbacks, and danger of explosion of pulverized coal; balances advantages and disadvantages.

Burner Design. Powdered Coal Used Exclusively in this Industrial Plant, F. K. North. Power, vol. 57, no. 2, Jan. 16, 1923, pp. 84–87, 10 figs. Design of burner adopted for all furnaces and ovens in power plant of Ill. Malleable Iron Co., Chicago.

PUMPS

Electrically Driven. The Pumping Plants of the Württemberg Water Supply (Germany) (Die Förderwerke der Württembergischen Landeswasserversorgung), H. Gross. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 49, Dec. 9, 1922, pp. 1093–1097, 11 figs. Arrangement and extension of water works; electrically driven pumping stations; centrifugal pumps; auxilliary machines; operating results.

Rotary. Rotary Pump with Reduced Friction Losses, A. Poitrineau. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 55–56, 1 fig. Describes new type of rotary pump with blades. Translated and abstracted from Arts et Metiers, vol. 75, no. 24, Sept. 1922.

[See also WATER ELEVATORS.]

PUMPS, CENTRIFUGAL

High-Lift. High Lift Centrifugal Pumps, J. Johnstoné Taylor. Colliery Guardian, vol. 124, nos. 3232 and 3233, Dec. 8 and 15, 1922, pp. 1397–1400 and 1463–1464, 25 figs. Arguments in favor of centrifugal pump in general and high-lift pump in particular; types. Stuffing boxes and bearings; special application for mining work; testing.

Turbo. Turbo-Centrifugal Pumps, C. R. Waller. Am. Water Works Assn.—Jl., vol. 10, no. 1, Jan. 1923, pp. 44–58, 4 figs. Discusses features which will allow engineer to judge merits of turbo-centrifugal pumping unit with pumping units of other designs.

R

RAILS

Reclamation. Reclamation of Railway Steel Rails, E. J. McVeigh. Can. Ry. & Mar. World, no. 298, Dec. 1922, pp. 595–597, 1 fig. Reclaiming of rails which are practically unworn but whose ends are battered rendering them unfit for use, by removal of battered end. Rail-sawing plants in use on Grand Trunk Ry.

RAILWAY CONSTRUCTION

Grades. The Problem of Heavy Gradients on Railways (El problema del empleo de fuertes pendientes ennuestros ferrocarriles), J. Alvarez Lleras. Anales de Ingenieria, vol. 29, nos. 349–350, Apr.-May 1922, pp. 543–555. Railway problems in Colombia; construction and management of gradients up to 3.5 per cent; movement of rolling stock; advantages of electric traction.

United States 1922. Construction Activities Improve During 1922. Ry. Age, vol. 74, no. 1, Jan. 6, 1923, pp. 116–122, 2 figs. Better conditions evident although miles abandoned continue to exceed new first track. Statistical data.

RAILWAY ELECTRIFICATION

Economical Justification. New Haven Operation Has Justified Electrification, Sidney Withington. Ry. Rev., vol. 72, no. 1, Jan. 6, 1923, pp. 71–73, 5 figs. Author qualifies extent to which steam-railway electrification is economically justified. Statement of issues involved.

France. Electrification of the Saint Gotthard Railway (L'elettrificazione della ferrovia del Gottardo), Ettore Kerbaker. Elettrotecnica, vol. 9, no. 27, Sept. 25, 1922, pp. 616–620, 14 figs. Power stations, transmission lines, insulators, substations, etc.

Holland. Railway Electrification in Holland (Sur l'éléctrification des chemins de fer aux Pays-Bas), L.-G. Stokvis. Revue Générale de l'Electricité, vol. 12, no. 23, Dec. 9, 1922, pp. 906–908, 3 figs. Describes existing monophase line, the Haye-Rotterdam, and work in progress on Rotterdam-Amsterdam line, to be operated by d.c. at 3000 volts.

Projects and Equipment, 1922. What Railroads Are Doing With Electric Traction, A. G. Oehler. Ry. Age, vol. 74, no. 1, Jan. 6, 1923, pp. 45–48, 1 fig. New projects and equipment; effect of stroke on electrified sections.

RAILWAY MANAGEMENT

Handling Supplies. The Custody and Delivery of Railway Material. Ry. Rev., vol. 71, nos. 23 and 25, Dec. 2 and 16, 1922, pp. 773–777 and 847–850 and vol. 72, no. 1, Jan. 6, 1923, pp. 86–89, 37 figs. Outline of methods used by A. T. & S. F. Ry. in handling its supplies; use of supply trains for delivering materials to outside points, and of gasoline and electric trucks and tractors for local transportation of supplies.

Signal and Telegraph Organization. The Signal and Telegraph Branch, Victorian Government Railways. Ry. Gaz., vol. 37, no. 26, Dec. 29, 1922, pp. 860–861. Manufacture, installation and maintenance of signals, telegraphs, telephones, etc., are independent of Way & Works Dept., and under a chief engineer, who report direct to railway commissioners.

RAILWAY MOTOR CARS

Canada. Self Propelled Cars on Steam Railways. Can. Ry. & Mar. World, no. 298, Dec. 1922, pp. 598–599, 1 fig. Data on cars to be put in service on Can. Nat., Grand Trunk, Greater Winnipeg Water District, Quebec Central, Quebec Montreal & Southern, and Timiskaming & Northern Ontario Railways, including gasoline, gasoline-electric, storage-battery, and steam cars.

Diesel-Electric. The Sulzer Diesel-Electric Rail Car. Engineer, vol. 134, no. 3496, Dec. 29, 1922, pp. 696–699, 11 figs. partly on p. 692. Internal arrangement and engine details of car and results of trial runs on Swiss railway line.

Gasoline-Electric. Successful Gasoline Electric Car Is Designed for Swiss Railroad. Jl. Electricity & West. Industry, vol. 50, no. 1, Jan. 1, 1923, p. 17, 1 fig. Self-propelled car designed with view to combine utility and flexibility of electric car and low installation cost of gasoline car.

Paris. New Light Motor Car for Paris Tramways. Elec. Ry. Jl., vol. 60, no. 23, Dec. 2, 1922, p. 878, 1 fig. Unified system in French metropolis is trying out novel form of car designed to secure as far as possible riding qualities and inherent lightness of automobile.

RAILWAY OPERATION

Train Control. The Automatic Control Problem, E. J. Blake. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 1, Jan. 1923, pp. 27–34, 5 figs. Desired characteristics; methods of transmitting an indication to train; controlled functions.

RAILWAY SHOPS

"Big Four" Ry. Story of What Has Been Accomplished at the Beech Grove Shops of the Big Four Railway. Ry. Rev., vol. 71, no. 27, Dec. 30, 1922, pp. 927–934, 9 figs. Analysis of methods and organization installed at Beech Grove shops of Cleveland, Cincinnati, Chicago & St. Paul Ry.

RAILWAY SIGNALING

A. R. A. Committee Reports. Meeting of Signal Section in New York. Ry. Signal Engr., vol. 15, no. 12, Dec. 1922, pp. 473–483, 8 figs. Committee reports of Am. Ry. Assn. on valuation, economics of signaling, standard designs, mechanical interlocking, a.c. signaling, batteries, d.c. relays, oils.

Automatic and Semi-Automatic. Automatic and Semi-Automatic Railway Signaling, H. S. Petch. Instn. Elec. Engrs.—Jl., vol. 61, no. 313, Dec. 1922, pp. 81–88, 4 figs. Notes on track circuit and apparatus controlled by track circuits; functions and chief features of semi-automatic working and advantages peculiar thereto; description of auxiliary apparatus designed to expedite handling of traffic.

Protecting Single Lines by Automatic Signals. Ry. Gaz., vol. 37, no. 24, Dec. 15, 1922, pp. 788–789, 5 figs. Account of installation by Victorian Government railways, New Zealand.

Construction 1922. Signal Construction Activities Show Improvement, K. E. Kellenberger. Ry. Age, vol. 74, no. 1, Jan. 6, 1923, pp. 141–152, 3 figs. Work completed, underway and proposed is 100 per cent greater than reported in 1921.

D. L. & W. Railway. Signaling Meadows Line of D. L. & W. Ry. Signal Engr., vol. 15, no. 12, Dec. 1922, pp. 465–472, 18 figs. Handling of heavy traffic on Delaware, Lackawanna & Western; track facilities and interlockers, signal aspects and indications, power supply, inter-lockings, switch movements, track circuits.

Electric Lamps. The Electric Lamp for Railway Signals, L. C. Porter and A. L. Broe. Ry. Signal Engr., vol. 15, no. 12, Dec. 1922, pp. 485–490, 11 figs. Methods of testing, directions for installation and operation to secure long life. Paper read before Am. Ry. Assn.

Interlocking Block. Traffic Direction by Signal Indication on D. L. & W. Ry. Age, vol. 73, no. 26, Dec. 23, 1922, pp. 1185–1188, 4 figs. Current of traffic on Meadows line is authorized only by interlocking block signals.

RAILWAY TIES

Preservative Treatment. Preservative Treatment of Railway Sleepers in India. Engineering, vol. 114, no. 2974, Dec. 29, 1922, p. 807. Results of long series of tests conducted jointly by Forest Dept. and Ry. Board.

Treating Plant. Treating Plant Solves New Haven's Tie Problem. Ry. Age, vol. 73, no. 26, Dec. 23, 1922, pp. 1179–1183, 10 figs. New installation at Cedar Hill renders possible use of hitherto unused New England timbers.

RAILWAYS

Argentina. Argentine Railways in 1921–22. Ry. Gaz., vol. 38, no. 1, Jan. 5, 1923, pp. 23–26 and 34. World trade depression; reduction in expenses; tariff increases.

New Transcontinental Line in Northern Argentina, Richard F. Maury. Ry. Age, vol. 73, no. 27, Dec. 30, 1922, pp. 1237–1239, 5 figs. Engineering problems involved; rich agricultural and oil lands made accessible.

Buildings. Specifications for Railway Buildings. Am. Ry. Eng.—Bul., vol. 24, no. 247, July 1922, 100 pp. General conditions; excavation, filling and backfilling; sewers and drainage; concrete; brickwork; carpentry and millwork; lathing and plastering; hardware; painting and glazing; plumbing; heating; stone masonry and cut stone work; clay hollow tile; steel and iron work; marble and tile work.

Eritrea, Africa. The Asmara-Cheren Railway (La ferrovia Asmara-Cheren), Carlo Tonetti. Rivista Tecnica delle Ferrovie Italiane, vol. 22, no. 5, Nov. 15, 1922, pp. 322–333, 12 figs. Describes second half of Italian line in Eritrea, from port of Massaua toward Abyssinia; permanent way, bridges and tunnels, etc.

France. Technical Operation of Railways (L'exploitation technique des chemins de fer), Ed. Bruet. Outillage, vol. 6, no. 50, Dec. 16, 1922, pp. 1672–1681, 11 figs. Particulars of French railways regarding train despatching, signal systems and control, train lighting, rolling stock for steam traction, continuous brakes for freight trains, electrification, history of railways, freight rates, insurance, etc.

Italy. Deterioration of the Italian Railways (Il disavanzo ferroviario italiano), Pietro Lanino. Ingegneria, vol. 1, no. 5, Nov. 1, 1922, pp. 115–118, 9 figs. Conditions arising from war and due to increased cost of material and labor; gives curves showing traffic movement in car-miles.

Jugo-Slavia. Jugo-Slavia Plans Railroads to Open Up Resources, W. G. Atwood. Eng. News-Rec. vol. 89, no. 25, Dec. 21, 1922, pp. 1070–1072, 7 figs. Survey of existing and projected transportation facilities; American syndicate to finance improvements.

South America. Railway Transportation in South America, G. H. Burnham. Pan American Union Bul., vol. 55, no. 6, Dec. 1922, pp. 544–562, 12 figs. Review of railways in the various republics.

World Developments 1922. Railway Developments in 1922. Ry. Age, vol. 74, no. 1, Jan. 6, 1923, pp. 54–110, 83 figs. Review of developments in Great Britain, France, Italy, Poland, Russia, Central Europe, Germany, Mexico, Canada, Argentina, Australia, S. Africa, India, Japan and China.

REDUCTION GEARS

Internal. Internal Gear Reduction Mechanism, E. J. Bradley. Machy. (Lond.), vol. 21, no. 535, Dec. 28, 1922, pp. 406–408, 5 figs. Describes new form consisting of two gears only, and internal gear and

Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mch. Co.
Whiting Corp'n

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Ridgway Dynamo & Engine Co
* Terry Steam Turbine Co.

Turbo-Blowers
Brinckerhoff, H. Gordon Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Turbo-Compressors
* Ingersoll-Rand Co.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.

Turbo-Pumps
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

Turntables
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Underfeed Stokers
(See Stokers, Underfeed)

Unions
* Crane Co.
* Lunkenheimer Co.
* Vogt, Henry Machine Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Unloaders, Car
Link-Belt Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Goetze Gasket & Packing Co.
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
United States Rubber Co.

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Fulton Co.
* Jenkins Bros.
* Simplex Valve & Meter Co.
* Smith, H. B. Co.

Valves, Air, Relief
* Fulton Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Altitude
* Simplex Valve & Meter Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* Davis, G. M. Regulator Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
* Crane Co.
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Blow-off
* Ashton Valve Co.
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
Elliott Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Valves, Butterfly
* Crane Co.
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Check
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Electrically Operated
* Chapman Valve Mfg. Co.
* Dean, Payne (Ltd.)
* General Electric Co.
Kennedy Valve Mfg. Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Exhaust Relief
* Crane Co.
* Davis, G. M. Regulator Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.

Valves, Float
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co
* Simplex Valve & Meter Co.

Valves, Foot
* Crane Co.
* Worthington Pump & Machy. Corp'n

Valves, Gate
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Vogt, Henry Machine Co.

Valves, Hose
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Valves, Hydraulic
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Hydraulic Operating
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Davis, G. M. Regulator Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Plug
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Pump
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
United States Rubber Co.

Valves, Radiator
* American Radiator Co.
* Crane Co.
* Dean, Payne (Ltd.)
* Fulton Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Valves, Radiator, Packless
* American Radiator Co.
* Fulton Co.

Valves, Reducing
* Davis, G. M. Regulator Co.
Elliott Co.
* Fulton Co.
* Kieley & Mueller (Inc.)

Valves, Regulating
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Simplex Valve & Meter Co

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Stop & Check
(See Valves, Non-Return)

Valves, Superheated Steam (Steel)
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Div.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Thermostatically Operated
* Dean, Payne (Ltd.)
* Fulton Co.

Valves, Throttle
* Crane Co.
* Hooven, Owens, Rentschler Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nelson Valve Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schutte & Koerting Co.

Ventilating Systems
* American Blower Co.
Clarage Fan Co.

Vibration Indicating Machines
* Vibration Specialty Co.

Voltmeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co

Vulcanizers
* Bigelow Co

Wash Bowls
Manufacturing Equipment & Engrg. Co.

Washers, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Water Cinder Mills
(See Mills, Cinder, Water)

Water Circulators, Filters, Gages, Heaters, Meters, Strainers, etc.
(See Circulators, Filters, Gages, Heaters, Meters, Strainers, etc., Water)

Water Columns
* Ashton Valve Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Water Purifying Plants
* Graver Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
Brinckerhoff, H. Gordon Co.
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.
Wayne Tank & Pump Co.

Water Tube Boilers
(See Boilers, Water Tube)

Water Wheels
(See Turbines, Hydraulic)

Waterbacks, Furnace
Green Engineering Co.

Waterproofing Materials
* Johns-Manville (Inc.)
Texas Co.

Wattmeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Welding and Cutting Work
Linde Air Products Co.

Welding Equipment, Electric
* General Electric Co.

Wheels, Car
* Fuller-Lehigh Co.

Wheels, Polishing Paper
Rockwood Mfg. Co.

Whistles, Steam
* Ashton Valve Co.
Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Winches
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.

Wire, All Metals
Driver-Harris Co.

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Flat
* Roebling's, John A. Sons Co.

Wire, Iron and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* General Electric Co.
* Roebling's, John A. Sons Co.
United States Rubber Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

Worm Gear Drives
* Foote Bros. Gear & Mach. Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A., Fdy. & Mach. Co.

Wrenches
*Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

pinion with which it is possible to secure reduction up to 20 to 1 in diam. of 12 in.

REFRACTORIES

Production. Effect of Some Typical Fireclays on the Behavior of Refractory Masses at High Temperatures (Ueber den Einfluss einiger typischer feuerfester Tone auf das Verhalten von Schamottemassen bei höheren Temperature), W. Steger. Berichte der Deutschen Keramischen Gesellschaft, vol. 3, no. 5, Oct. 1922, pp. 250–256, 2 figs. Discusses shrinking porosity, flexure of test bars, softening at high temperatures, tensile strength when cold, resistance to quick temperature changes, size of grain, and proportion of mixture.

REFRIGERATING MACHINES

Absorption. Principles and Practical Operations of Absorption Machines, Heywood Cockran. Power, vol. 57, no. 2, Jan. 9, 1923, pp. 53–55, 1 fig. Includes diagtammatic outline of present-day absorption machine.

Compression. Ammonia as a Refrigerant, W. H. Motz. Can. Chem. & Metallurgy, vol. 6, no. 12, Dec. 1922, pp. 260–264 and vol. 7, no. 1, Jan. 1923, pp. 7–11. Fundamental data relative to all factors in operation of compression refrigerating systems, calculating refrigerating effects, heat quantities, etc., for ammonia. Paper read before convention of Practical Refrig. Engrs.

Dairy Plants. Refrigerating Machines for Dairies (Die Kaltemaschine in Milchwirtschaftlichen Betrieb). Wärme- u. Technik, vol. 24, no. 23, Dec. 1, 1922, pp. 271–274, 11 figs. Apparatus for cooling milk and dairy products generally.

REFRIGERATING PLANTS

Measuring Devices. Measuring Devices for Refrigerating Plants, John E. Starr. Power, vol. 56, no. 26, Dec. 26, 1922, pp. 1010–1011. Thermometers, gages to measure pressures carried, meters to gage brine circulation, and indicator by which compressor and engine operation may be checked. Paper read before Nat. Assn. Practical Refrig. Engrs.

RESEARCH

Executive's Viewpoint. The Executive and Research, John A. Matthews. Am. Soc. for Steel Treating—Trans., vol. 3, no. 4, Jan. 1923, pp. 393–395. Viewpoint of executive. Executive's and research department's functions; scientific method of examining facts.

Fundamentals. Some Fundamentals of Research, E. O. Clements. Am. Soc. for Steel Treating—Trans., vol. 3, no. 4, Jan. 1923, pp. 415–421 and 429. Discusses three kinds of research and gives typical example of research development.

ROLLING MILLS

Camber on Rolls. Camber on Rolls, C. E. Davies. Machy. (Lond.), vol. 21, no. 532, Dec. 7, 1922, pp. 299–302, 5 figs. Discusses principles governing roll camber, after calling attention to various kinds of rolling operations. Curves are presented showing relation between deflection curve and roll camber.

Electrically Driven. Improved Rolling Mill Practice Obtained by the Use of Direct Current Motors for Main Roll Drive, G. E. Stoltz. Assn. Iron & Steel Elec. Engrs., vol. 4, no. 12, Dec. 1922, pp. 777–793 and (discussion) 793–799, 10 figs. Items to be considered in selection of speed at which mill is to be operated.

Pencil Factory. A Rolling Mill in a Pencil Factory, Gilbert L. Lacher. Iron Age, vol. 111, 1, Jan. 4, 1923, pp. 26–30, 7 figs. Rolling and drawing of precious metals among features in production of scheme of Wahl Co., Chicago; special machinery developed.

Rod Mill. Minnesota Steel Adds New Mills, A. J. Hain. Iron Trade Rev., vol. 71, no. 26, Dec. 28, 1922, pp. 1772–1778, 9 figs. New rod mill of Duluth plant of U. S. Steel Corp. for manufacture of wire rod, wire and nail units.

Roll Grinding. Roll Grinding and Maintenance. Machy. (Lond.), vol. 21, nos. 534 and 535, Dec. 21 and 28, 1922, pp. 353–359 and 385–392, 18 figs. Machines and methods used for producing straight and cambered rolls. Roll-grinding practice; wheels, speeds and feeds; copper roll grinding.

S

SAND BLAST

Modern Types. Modern Arrangements of Sand Blasts (Neuere Anordungen von Sandstrahlgebläsen), F. Lohse. Giesserei-Zeitung, vol. 19, nos. 46, 47 and 48, Nov. 21, 28 and Dec. 5, 1922, pp. 671–674, 683–688 and 695–700, 34 figs. Cleansing effect of sand blast; sand drying; dust removal by means of sand collectors, dust filters, centrifugal collectors, coke filters and separators; pressure sand blasts with single- and multi-chamber apparatus; different types of sand blasts. Arrangement of cleaning plant for 30,000 to 40,000 kg. daily performance.

SAND, MOLDING

Properties and Treatment. Sand Molds (Sablerie), Fonderie Moderne, nos. 10 and 11, Oct. and Nov. 1922, pp. 295–297 and 324–328, 8 figs. Discusses preparation for foundry, chemical analysis, analysis for physical properties, treatment of sand at foundries. Sand for steel, copper, aluminum and alloy foundries. Organization of sand-mold departments; microscopic examination.

Testing. New Method of Testing Foundry Sands, Eugene W. Smith. Iron Age, vol. 110, no. 126, Dec. 28, 1922, pp. 1725–1726. Vibratory precipitation advocated for determining bond, silica and other properties for molds and cores. (Abstract.) Paper before Chicago Foundrymen's Club.

Some Tests for Foundry Sands and Their Practical Application, W. West. Foundry Trade Jl., vol. 26, no. 330, Dec. 14, 1922, pp. 495–498. Deals with basic principles upon which sand mixture should be built; difference in properties required of sands for iron and those for steel foundry.

SCALES

Automatic. New Automatic Scales, H. Heller. Eng. Progress, vol. 3, no. 12, Dec. 1922, pp. 271–273, 6 figs. Details of automatic calibrated filling scale of the Garvens Works, Hanover-Wülfel, and weighing machine for postal parcels by Dopp Bros., Berlin.

SCREW MACHINES

Cast-Iron Bars in Automatic. Using Cast-Iron Bars in Automatics, Fred H. Colvin. Am. Mach., vol. 58, no. 3, Jan. 18, 1923, pp. 97–99, 11 figs. Casting and cleaning bars; pointing and "skinning" to size; how bars are used in automatic machines.

SCREW THREADS

Synchronizing. Synchronizing Screw Threads by Lead Variator. Can. Machy., vol. 28, no. 25, Dec. 21, 1922, pp. 13–15, 10 figs. Article compiled from illustrations and data supplied by Precision & Thread Grinder Mfg. Co., Philadelphia, Pa.

Worm, Thickness of. The Normal Thickness of a Worm Thread, E. A. Limming. Machy. (Lond.), vol. 21, no. 534, Dec. 21, 1922, pp. 360–362, 4 figs. Formulas for measurement.

SOOT BLOWERS

Types. Types and Arrangement of Soot Blowers, Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 20–24, 8 figs. Methods of overcoming effect of high temperatures and prevention of too rapid operation; how elements are applied to various boilers.

STEAM

Condensate, Discharge of. The Operation of Modern Condensate Discharge Valves (Die Wirkungsweise neuerer Kondenswasserableiter), E. Raisch. Zeit. des Bayerischen Revisions-Vereins, vol. 26, no. 23, Dec. 15, 1922, pp. 183–188, 7 figs. General remarks on separation and discharge of water; features and defects of usual types of condensate discharge valves; account and results of tests on three different types of modern construction which operate without any movable parts.

Priming and Condensation. Undigested Water Makes Steam Vicious. Power Plant Eng., vol. 27, no. 1, Jan. 1, 1923, pp. 64–71, 14 figs. Causes, effects and remedies for priming and condensation.

Tables, Reading of. Method of Reading Steam Tables Correctly, T. H. Fenner. Power House, vol. 15, no. 23, Dec. 5, 1922, pp. 21–23. Explanation of what each column in steam table means, and some examples of method of application to every-day problems.

STEAM ENGINES

Condensation in. Condensation in Steam Engines (La Condensation dans les Machines à vapeur), Métallurgie, vol. 54, no. 50, Dec. 14, 1922, pp. 1865–1867. Condensation by injection and surface condensation in marine engines.

Rotary. Rotary Engines as Power and Working Machines (Drehkolbenmaschinen als Kraft- und Arbeitsmaschinen), R. Plank. Zeit. fur die gesamte Kälte-Industrie, vol. 29, nos. 10 and 11, Oct. and Nov. 1922, pp. 189–194 and 199–203, 19 figs. Advantages and difficulties; review of development based on description of various types. Comparison with ordinary reciprocating engines and turbogenerators.

Uniflow. A Unaflow Engine Without Auxiliary Exhaust Valves. Power, vol. 56, no. 26, Dec. 26, 1922, pp. 1024–1025, 4 figs. Design of Harrisburg dual clearance unaflow.

STEAM METERS

Float-Type. New Steam Meter with Float and Steam Recorder. Eng. Progress, vol. 3, no. 12, Dec. 1922, pp. 274–275, 7 figs. Meters placed on market by Ernest Claasen & Co., Berlin-Lichterfelde, for installation in heating systems where steam is taken from exhaust of steam engine.

STEAM PIPING

Covering, Heat-Insulating. An Improved Method of Analysis for "85 Per Cent Magnesia" Covering, H. W. Greider. Jl. Indus. & Eng. Chem., vol. 15, no. 1, Jan. 1923, pp. 50–53. Study of proximate method of analysis for commercial heat-insulating coverings, with particular attention to method of sampling, separation and determination of asbestos fiber and determination of new and more correct gravimetric factor for calculation of basic magnesium carbonate from magnesium pyrophosphate.

STEAM TRAPS

Selection and Use. Selection and Use of Traps, Charles L. Hubbard. Nat. Engr., vol. 26, no. 12 Dec. 1922, pp. 576–579, 16 figs. Various types and service applications.

STEAM TURBINES

Bleeder. The Bleeder Turbine, J. L. Moore. Combustion, vol. 7, no. 6, Dec. 1922, pp. 343–344, 2 figs. Details of design.

Use of the Bleeder Turbine in Industrial Plants, J. L. Moore. Power Plant Eng., vol. 27, no. 2, Jan. 15, 1923, pp. 126–128, 4 figs. Where steam is required for heating or for process work, bleeder turbine may be used to advantage.

Leveling Bases. Using Shims Instead of Wedges for Leveling Bases of Steam Turbines, Edgar C. Barker, Sr. Power, vol. 57, no. 2, Jan. 9, 1923, pp. 58–60, 2 figs. Outlines ingenious and practical method of providing plane surface composed of iron blocks for supporting bedplate and preventing undue strain while installing.

STEEL

Brittleness. Brittleness of Steel and Notch-Bar Tests (La fragilité des aciers et l'essai de flexion par choc unique sur barreaux entaillés), Henri Pommerenke. Revue de l'Industrie Minérale, no. 48, Dec. 15, 1922, pp. 741–747. Results of experiments extending over 17 years as to absolute brittleness, intermediary brittleness, and resistance to impact.

Drill. A Metallographic Study of Hollow Rock Drill Steel, As Influenced by the Method of Manufacture, N. B. Hoffman. Am. Soc. for Steel Treating—Trans., vol. 3, no. 4, Jan. 1923, pp. 436–446, 24 figs. Method of manufacture; types of steel tested and test procedure. Photomicrographs.

High-Speed. See STEEL, HIGH-SPEED.

Iron and. See IRON AND STEEL.

Nickel. See NICKEL STEEL.

Nitrogen in. Gases in Metals: I. The Determination of Combined Nitrogen in Iron and Steel and the Change in Form of Nitrogen by Heat Treatment, Louis Jordan and F. E. Swindells. U. S. Bur. of Standards, Sci. Papers, vol. 18, no. 457, Nov. 8, 1922, pp. 499–511, 1 fig. The Allen method for combined nitrogen and nitrides determined by this method; two forms of nitrogen in steel.

Numbering. European Attempts to Number Steel. Chem. & Met. Eng., vol. 28, no. 1, Jan. 3, 1923, pp. 19–20. Progress made by Switzerland, Germany and France toward standardization.

Properties at High Temperature. Effect of Temperature on the Mechanical and Microscopic Properties of Steel, George C. Priester and Oscar E. Harder. Chem. & Met. Eng., vol. 28, no. 3, Jan. 17, 1923, pp. 111–115, 13 figs. Points out that properties of low-carbon steel in blue-heat range are inherent to that temperature and are not duplicated when same metal is tested at room temperature after corresponding tempering.

Structural. See STRUCTURAL STEEL.

Tensile Properties. Effect of Temperature, Deformation, and Rate of Loading on the Tensile Properties of Low-Carbon Steel Below the Thermal Critical Range, H. J. French. U. S. Bur. of Standards Technologic Papers, no. 219, Aug. 22, 1922, pp. 679–725, 31 figs. Describes apparatus for determining tensile properties of metals at high temperatures (including limit of proportionality), and results of tests of several grades of boiler plate from 20 to 465 deg. cent.; effects of cold and blue work on properties of these steels throughout range given. Bibliography.

Tests. Permanent Deformation of Steels by Elongation, Bending and Torsion (Déformations permanentes des aciers par traction, flexion et torsion), J. Seigle. Revue de l'Industrie Minérale, no. 48, Dec. 15, 1922, pp. 655–673, 29 figs. Experiments with test bars of soft and hard steels; diagrams showing variations for elongation, bending and torsion.

STEEL, HEAT TREATMENT OF

Cast Steel. The Heat Treatment of Cast Steel for Hydroelectric Power Machinery, B. Egeberg. Am. Soc. for Steel Treating—Trans., vol. 3, no. 4, Jan. 1923, pp. 422–429, 13 figs. Outlines specifications usually used in Norway in ordering steel castings for hydroelectric plants; these include chemical composition, physical properties and thermal treatment.

Methods. Heat Treatment of Steel and Metallic Alloys (La trempe de l'acier et des alliages métalliques), Albert Portevin. Revue Universelle des Mines, vol. 15, no. 6, Dec. 15, 1922, pp. 225–332, 31 figs. Also Revue de Métallurgie, vol. 19, no. 12, Dec. 1922, pp. 717–740, 8 figs. Character and kinds of changes, i.e., physical, chemical magnetic, and structural, produced by heat treatment generally; effect of velocity of cooling; gives equilibrium diagrams.

STEEL, HIGH-SPEED

Segregation. Carbide Segregation in High Speed Steel, A. E. White. Am. Soc. for Steel Treating—Trans., vol. 3, no. 4, Jan. 1923, pp. 386–392, 18 figs. Points out that degree of segregation depends upon casting temperature, rate of cooling ingot and degree of mechanical reduction in mills.

STEEL INDUSTRY

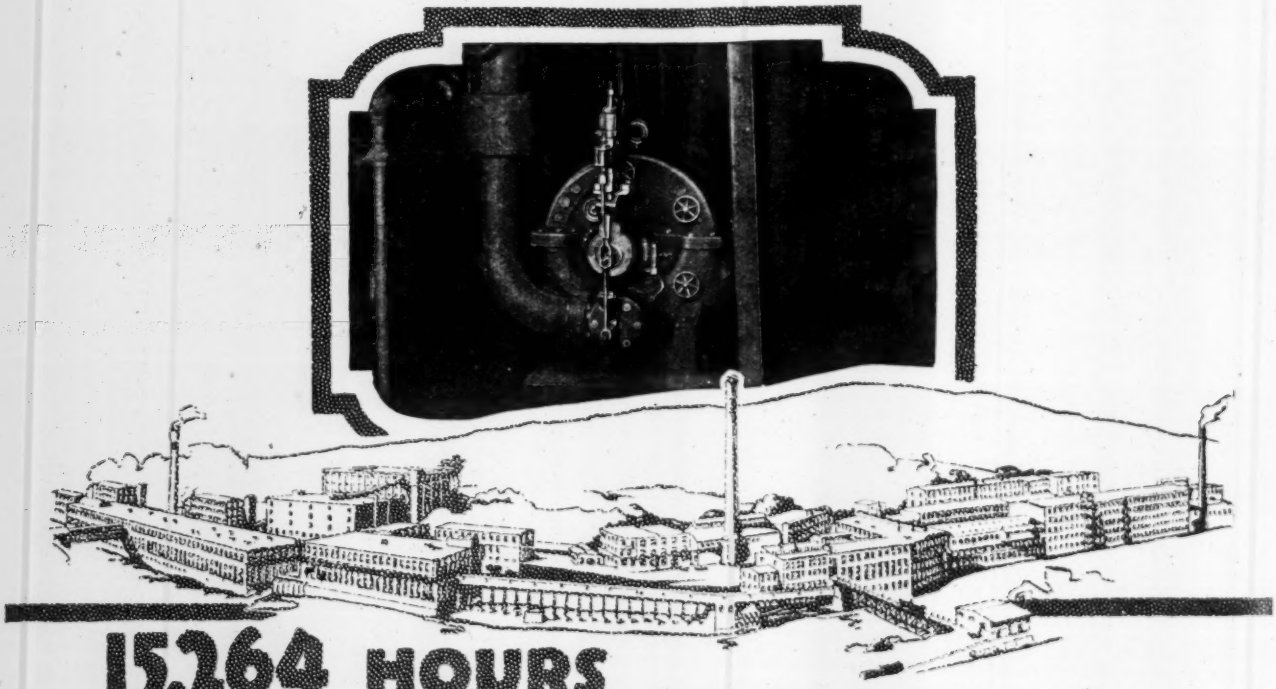
Germany 1922. Year of Distress for German Steel Industry, Emil Schroedter. Iron Age, vol. 111, no. 1, Jan. 4, 1923, pp. 64–66 and 79. Ruinous effect of mark's fall and short work day; production tends to lighter forms and higher quality; high costs compel fuel economies.

Practical Information. The Need for More Practical Information in Industry, J. S. Unger. Am. Soc. for Steel Treating—Trans., vol. 3, no. 4, Jan. 1923, pp. 430–435. Plea for more reliable data and information; suggestions on practical problems of investigation.

Problems. Germans Discuss Steel Problems, Hubert Hermanns. Iron Trade Rev., vol. 71, no. 25, Dec. 21, 1922, pp. 1711–1712. Outline work of technical committees at fall meeting of German Iron & Steel Inst. (Verein Deutscher Eisenhüttenleute.)

STEEL MANUFACTURE

Dephosphorization and Basicity. The Dephosphorization of Iron in the Basic Furnace, J. H.



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Whiteley. **Iron & Coal Trades Rev., vol. 105, no.** 2858, Dec. 8, 1922, pp. 839–840, 2 figs. Points out that in general basicity must be increased with P_2O_5 content of slag, and if this rule is followed iron content not exceeding 7 per cent is sufficient for most purposes. (Abstract.) Paper read before Cleveland Instn. Engrs.

Direct Process. Steel Manufacture, Especially by the Bassett Process (Algo sobre la fabricacion del acero i en especial sobre el metodo Bassett). Sociedad Nacional de Mineria—Boletin Minero, vol. 34, no. 277, May 1922, pp. 238–261, 1 fig. Direct production of steel by Basset process; analyses, heat balance, cost data, etc.

Electric Process. New Steel-Making Process. Times Trade Supp., vol. 11, no. 230, Dec. 2, 1922, p. 282. Describes steel-melting furnaces and patent duplex electric process of Stobie Steel Co.

Metals and Alloys for. Metals and Alloys for the Manufacture of Special Steels (Les métaux et alliages pour la fabrication des aciers speciaux), Revue d'Electrochimie et d'Electrométallurgie, vol. 16, nos. 2 and 3, Feb.-Mar. and Apr.-May 1922, pp. 25–28 and 49–55. Feb.-Mar.: Discusses nickel and nickel alloys; tungsten and tungsten alloys; analyses of composition of alloy steels. Apr.-May: Chromium and chromium alloys; chromium steels; vanadium; titanium and its alloys.

STEEL WORKS

Reconstruction. Reconstruction and Extension of Steel Works Without Interrupting Operations (Umbau und Vergrösserung von Stahlwerken ohne Unterbrechung des Betriebes). Gewerbefleiss, vol. 101, no. 11, Nov. 1922, pp. 323–328, 8 figs. Construction work carried out at Thomas Steel Works in Lorraine.

Scotland. The Mossend Steel Works and Rolling Mills. Engineering, vol. 114, nos. 2963, 2964, 2966, 2969, 2971 and 2974, Oct. 13, 20, Nov. 3, 17, 24, Dec. 8 and 29, 1922, pp. 447–448, 484 and 494, 543–545, 603–606, 641–643, 704 and 795–797, 51 figs. partly on supp. plates. Describes installation of plant comprising sixteen 50-ton Siemens-Martin furnaces, with necessary gas producers and other accessories; and rolling-mill plant, completed December 1919.

Toronto, Ohio. Plant Embodies Modern Practice, John D. Knox. Iron Trade Rev., vol. 72, no. 2, Jan. 11, 1923, pp. 153–158 and 160, 9 figs. Installation of steel works and semi-finishing mills in conjunction with sheet mills by Follansbee Bros. Co., at Toronto, Ohio, permits control of operations from production of open-hearth steel to finished product. Description of plant.

STOKERS

Developments in Practice. Developments in Stoker Practice. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 14–21, 4 figs. Contains extracts from following papers: The Development and Use of the Modern Chain Grate, T. A. Marsh; Overfeed Stokers of the Inclined Type, Geo. I. Bouton; The Design and Operation of Underfeed Stokers, H. F. Lawrence. Discussion, pp. 21–24.

STRAIGHTENING MACHINES

Abramsen. The Abramsen Straightening Machine for Round Bars and Tubes. Engineering, vol. 114, no. 2972, Dec. 15, 1922, pp. 736–737, 7 figs. Details and operation of machine put on market by J. Bigwood & Son, Ltd., Wolverhampton.

STRIKES

Value of. The Value of Lock-Outs and Strikes, L. Askwith. Roy. Soc. of Arts—Jl., vol. 71, no. 3653, Nov. 24, 1922, pp. 2–15 and (discussion) 15–16. Discusses value and results of strikes and gives details of exceptionally large disputes occurring since end of war.

STRUCTURAL STEEL

Torsional Strength. The Torsional Strength of Bars, Constantin Weber. Mech. Eng., vol. 45, no. 1, Jan. 1923, pp. 45–47, 16 figs. Mathematical treatment of torsional strength of bars, giving a general solution of problem together with precise solutions for certain cases and approximate solution for others. Translated from Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 31–32, Aug. 31, 1922.

T

TESTING MACHINES

Oscilloscope. Practical Application of Mechanical Oscilloscope. Can. Machy., vol. 28, no. 24, Dec. 14, 1922, pp. 18–19 and 28, 3 figs. Describes Elverson oscilloscope and its operation; tuning down high-speed mechanisms so that same are visible to naked eye; high-tension current employed for lamps; use of "creeper" gear.

TIDAL POWER

Germany. The Utilization of Ebb and Tide on the German Coast (Die Ausnutzung von Ebbe und Flut an der deutschen Kuste), H. Siemonsen. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 48, Dec. 2, 1922, pp. 1077–1079, 9 figs. For larger plants only artificially created head can be utilized and most favorable arrangement is that of two basins, in dividing dam of which turbines are installed. Because of high costs of installation, tidal-power works on the German coast must be regarded, at least up to present time, as altogether uneconomic.

Practical Application. Harnessing the Tides, Can. Engr., vol. 43, no. 23, Dec. 5, 1922, p. 604. Scientific study of practical application; different aspects of utilization; system of basins employed. Translated from Nature.

TOLERANCES

Screw-Thread. English Screw Thread Tolerances (Englische Gewindetoleranzen), G. Berndt. Werkstatts Technik, vol. 16, no. 24, Dec. 15, 1922, pp. 747–748. Comparison of English, American and German standards with those proposed by A. Herbert Co.

TRACTORS

Farm. Factors Influencing Tractor Development, L. J. Fletcher. Agricultural Eng., vol. 3, no. 11, Nov. 1922, pp. 179–182, 2 figs. With special reference to its adaptation as agricultural machine.

TRANSPORTATION

Industrial Plants. Internal Transportation in a Large Plant, W. Rockwood Conover. Management Eng., vol. 4, no. 1, Jan. 1923, pp. 15–18, 8 figs. Standard and narrow-gage railways, trucks and tractors enable Gen. Elec. Co. to reduce hand labor.

TUBES

Brass. Defects in Brass Tubes. Foundry Trade Jl., vol. 26, no. 327, Nov. 23, 1922, pp. 427–428. Mold dressings; internal defects and pouring temperatures; speed of teeming and slag inclusions; annealing defects; drawing defects. Abstract of paper by W. E. Ballard before Birmingham Univ. Met. Soc.

TURBO-GENERATORS

Pedestals. The Design of Structural Supports for Turbo-Generators, Edward H. Cameron. Am. Soc. Civ. Engrs.—Proc., vol. 49, no. 1, Jan. 1923, pp. 37–52, 6 figs. Relative merits of three types of pedestals, reinforced-concrete, structural-steel, and composite; nature of vibrations is described and suggestion is made that definite horizontal impact allowance should be adopted, in addition to vertical impact allowance now generally used.

V

VENTILATION

Auditorium. Ventilating the Cleveland Auditorium, C. L. Riley. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 28, no. 9, Dec. 1922, pp. 843–852, 8 figs. Five separate and complete ventilating systems are used, three being located in attic space, one in basement and one on basement mezzanine.

Bank Building. Improving Air Conditions in a Chicago Bank Building, E. Vernon Hill. Heating & Vent. Mag., vol. 19, nos. 11 and 12, Nov. and Dec. 1922, pp. 37–40 and 38–42, 13 figs. How tests disclosed faults in ventilating systems and suggested remedy.

Modern Tendencies. Modern Tendencies of Ventilation Practice, George T. Palmer. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 1, Jan. 1923, pp. 27–44. Developments of half century and forecast of what future holds as indicated by present status of development.

Principles and Practice. Ventilation Principles and Practice. Contract Rec., vol. 36, nos. 50 and 51, Dec. 13 and 20, 1922, pp. 1187–1191 and 1206–1208 and 1212. Importance of ventilation and systems that are applicable to various types of buildings; standard requirements; relationship of heating and ventilation.

Roof Ventilators. Comparative Tests of Roof Ventilators, F. B. Rowley. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 1, Jan. 1923, pp. 9–13, 13 figs. Report of tests of five distinct types and description of method and apparatus used.

Tunnels. Ventilation of the Königstuhl Tunnel at Heidelberg (Die Entluftung des Königstuhltunnels zu Heidelberg), Maas. Bauingenieur, vol. 3, nos. 21 and 22, Nov. 15 and 30, 1922, pp. 645–652 and 687–691, 10 figs. Ventilation by exhaustion from center; design of plant; supposed flaws in installation and remedies proposed.

VIBRATIONS

Photography of. High-Speed Photography of Vibrations (Sound, Mechanical, Electrical, Etc.), Augustus Trowbridge. Franklin Inst.—Jl., vol. 194, no. 6, Dec. 1922, pp. 713–729, 11 figs. Applications of photographic recording to study of vibrations in running machinery. Design of camera and galvanometer; damping.

VISCOSITY

Liquid Films. A Problem in Viscosity: The Thickness of Liquid Films Formed on Solid Surfaces under Dynamic Conditions. Lond., Edinburgh, and Dublin Philosophical Mag. and Jl. of Sci., vol. 44, no. 263, Nov. 1922, pp. 1002–1014, 6 figs. partly on supp. plate. Develops equations for flat slabs of infinite width and fine wire; experimental results and apparatus used.

W

WAGES

Group vs. Collective Bargaining. Group Versus Collective Bargaining in the Railway Shop. Ry. Rev., vol. 72, no. 1, Jan. 6, 1923, pp. 76–83, 6 figs. Labor corporation formed at Beech Grove Shops of Big Four Ry. Advantages of group over collective bargaining.

Incentive Basis. The Human Elements of Wage Incentive, Dale S. Cole. Indus. Management (N. Y.), vol. 65, no. 1, Jan. 1923, pp. 39–41, 1 fig. Points our importance of contentment on worker's part.

International Comparison. Wages Compared Internationally, M. S. Birkett. Iron Trade Rev., vol. 72, no. 2, Jan. 11, 1923, pp. 159–160. Standards in European iron and steel-producing centers, in relation to American; purchasing capacity is indicated.

Piece-Rate Methods. The Adjustment of Piece Rates, C. C. Hermann. Indus. Management (N. Y.), vol. 65, no. 2, Feb. 1923, pp. 88–92, 4 figs. Discusses method for establishing accurate basic rates, as well as method whereby these rates can be adjusted in accordance with prevailing supply-and-demand situation as to common labor.

WASTE HEAT

Utilization. The Utilization of Waste Heat, John B. C. Kershaw. Combustion, vol. 7, no. 6, Dec. 1922, pp. 328–334 and 360, 5 figs. Heat losses from steam boilers, and recovery of waste heat from boiler exit-gases. Describes most efficient forms of heat-saving appliances that have been used in England, America, France and Germany.

Using Waste Heat of Gas Works (Energiegewinnung aus der Abwärme der Gaswerke), Trautmann. Gesundheits-Ingenieur, vol. 45, no. 52, Dec. 30, 1922, pp. 642–644. Use of flue gases for steam production.

WATER ELEVATORS

Caruelle. Tests of Caruelle Water Elevators. Engineering, vol. 114, no. 2973, Dec. 22, 1922, pp. 770–771, 5 figs. Results of tests of water lifter made by Boulton & Paul, Ltd., Norwich.

WATER POWER

Problem. The Water Power Problem. A Symposium. Am. Soc. Civ. Engrs.—Proc., vol. 49, no. 1, Jan. 1923, pp. 113–122, 1 fig. Discussion continued from Dec. 1922 Proc.

Washington, Cascade Range. Water Powers of the Cascade Range Wenatchee and Entiat Basins, Glen L. Parker and Lasley Lee. U. S. Geol. Survey, Water Supply Paper, no. 486, 1922, 76 pp., 12 figs Report based on data of daily stream-flow records, miscellaneous measurements, river plans and profiles, reservoir surveys, topographic maps, and results of reconnaissances made by U. S. Geol. Survey, supplemented by information from State officials, private individuals and officials of private enterprises.

WEIGHING MACHINES

Automatic Continuous. The Schaffer Poidometer. Indus. Management (Lond.), vol. 8, no. 11, Dec. 14, 1922, pp. 359–360, 1 fig. Automatic continuous weighing machine, consisting of feed hopper, short band conveyor and weighing device which records amount passed over band conveyor in given space of time.

WELDING

Steel Works. Welding as a Factor in Steel Plant Maintenance, E. R. Norris. Am. Welding Soc.—Jl., vol. 1, no. 12, Dec. 1922, pp. 7–15, 7 figs. Notes on welding heads on peels, repairing pinions, port coolers, doors and frames on furnaces, bloom-mill housing, spindles, turbine casings, etc.; miscellaneous repairs and construction work.

[See also ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE; OXY-ACETYLENE WELDING.]

WINDING ENGINES

Electric. Electric Winding Engines With Ward Leonard Ilgner Converter Group (Machine d'extraction électrique avec groupe convertisseur Ward Leonard Ilgner), G. Hacault. Revue Générale de l'Electricité, vol. 12, nos. 22 and 23, Dec. 2 and 9, 1922, pp. 835–841 and 877–890, 11 figs.

Safety-Factor Calculation. Calculating the Safety Factor in Winding Engines (Beräkning av en gruvlinas säkerhetsgrad), B. G. Markman. Teknisk Tidskrift, vol. 52, no. 47, Nov. 25, 1922, pp. 756–760, 2 figs. Develops formulas and makes calculations.

WIRE

Welding, Specifications. Writing Specifications for Welding Wire, H. G. Knox. Am. Welding Soc.—Jl., vol. 1, no. 11, Nov. 1922, pp. 47–50. Specifications prepared by committee of Am. Welding Soc.

WOOD

Basswood. Utilization of Basswood, Warren D. Brush. U. S. Dept. of Agriculture, Bul. No. 1007, (Professional Paper), June 5, 1922, 64 pp., 18 figs. Properties of the wood; supply; future of basswood timber; utilization by industries; raw material used in form of log, bolt, and lumber.

WOODWORKING MACHINES

Development. Modern Developments in Wood-Working Machinery. Wood-Worker, vol. 41, no. 10, Dec. 1922, pp. 35–36, 5 figs. Comparison of some examples of modern machines with some older ones.

Manufacture. Building Woodworking Machinery. Eng. Production, vol. 5, no. 114, Dec. 7, 1922, pp. 533–537, 12 figs. Works and methods of Wadkin & Co., Leicester, England.

WORKMEN'S COMPENSATION

Social Insurance and. Workmen's Compensation and Social Insurance. Monthly Labor Rev., vol. 15, no. 5, Nov. 1922, pp. 187–192. Account of meeting of Int. Assn. of Indus. Accident Boards and Commissions. Recent compensation reports in Colorado and S. Dakota. Franco-Belgian convention regarding miners' pensions.

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THE ENGINEERING INDEX

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(See also page 274 of this issue for supplementary items.)

ABRASIVE WHEELS

Polishing Departments. Polishing Room Arrangement. Bradford H. Divine. Machy. (N. Y.), vol. 29, no. 6, Feb. 1923, pp. 457–460, 4 figs. Arrangement of glue room, wheel drying room and wheel preheater; general methods of setting up polishing wheels.

ACETYLENE

Generators. Safe Practice in Handling Acetylene Generators. Power House, vol. 16, no. 1, Jan. 5, 1923, pp. 29–30, 1 fig. Recharging; search for leaks; testing working pressure; proportions of hose; safety fusible plugs.

AERONAUTICAL INSTRUMENTS

Accelerometer. The N. A. C. A. Three Component Accelerometer. Aerial Age, vol. 16, no. 2, Feb. 1923, pp. 74–75, 7 figs. Describes new instrument designed by experts of Nat. Advisory Committee for Aeronautics for use in experimental research on aircraft in free flight.

Design. Instruments for Aircraft. Times Trade & Eng. Supp., vol. 11, no. 235, Jan. 6, 1923, p. 399. Requirements in design; classification of instruments.

Speed Indicators. The Altitude Effect on Air Speed Indicators—II, H. N. Eaton and W. A. MacNair. Nat. Advisory Committee for Aeronautics, Report no. 156, 1922, 46 pp., 19 figs. Investigation, in which data obtained are sufficiently accurate and complete to enable viscosity correction to be deduced quantitatively for number of air-speed pressure nozzles in common use. Bibliography.

AERONAUTICS

Fuel, Lubricating and Cooling Systems. Aeronautical Fuel, Lubricating, and Cooling Systems. John F. Hardecker. Aerial Age, vol. 16, no. 2, Feb. 1923, pp. 60–62 and 90, 4 figs. Study of materials used, practical range of sizes of these materials, methods of construction and action of service conditions upon materials.

International Aeronautical Foundation. The International Aeronautical Foundation. (I. A. F.), William Knight. Aerial Age, vol. 16, no. 2, Feb. 1923, pp. 64–67. Outlines proposed object of Foundation, which is to uphold and enforce international laws agreed upon regarding use of aircraft in time of war, to further advance of aeronautics, and to encourage use of commercial aircraft along both national and international lines.

AIR COMPRESSORS

High-Pressure. Production of High-Pressure Air in Connection With Low-Pressure Lines (Erzeugung von hochgespannter Druckluft im Anschluss an Niederdruckleitungen), Giller. Dinglers polytechnisches Journal, vol. 337, no. 23–24, Dec. 2, 1922, pp. 228–229, 2 figs. Application of compressed air in mines, especially for locomotives; describes three-stage air compressors built by Demag, Duisburg.

Rotary Cellular. The Rotary Cellular Compressor. Iron & Coal Trades Rev., vol. 105, no. 2861, Dec. 29, 1922, p. 973, 5 figs. Machines developed by Bernard Holland & Co., deal with smaller quantities of air at higher pressure than is usually obtained with turbo-compressor.

AIR CONDITIONING

Humidifier. Air Fountain Humidifiers. Engineering, vol. 115, no. 2979, Feb. 2, 1923, pp. 141–142, 14 figs. on p. 144. Air-compressing, cleaning and humidifying apparatus designed for production of degree of humidity in atmosphere required in textile mills, but which can be used for other purposes.

Mist-Removal Plant. Industrial Mist Clearing Plants. P. Martell. Eng. Progress, vol. 4, no. 1, Jan. 1923, pp. 19–20, 3 figs. Removal of mist and vapor in industrial plants; scientific principle and methods of clearing mist; removing mist from individual vessels.

AIR LIFTS

Principle of Operation. Does the "Air Lift" Push or Pull the Water, Frank Richards. Power, vol. 57, no. 5, Jan. 30, 1923, pp. 177–178, 1 fig. Explanation of principle upon which air lift operates.

AIR PUMPS

Rate of Exhaustion by. Rate of Exhaustion of a Closed Tank by a Reciprocating Air Pump, Edgar Buckingham. U. S. Bur. of Standards, Technologic Papers, vol. 17, no. 224, Jan. 4, 1923, pp. 109–116. Equation is deduced for finding number of strokes of reciprocating air pump required to exhaust tank of large volume down to any given fraction of atmospheric pressure, assuming that piston and valves are tight. Resulting formula shows how clearance and valve loading affect speed of exhaustion and final minimum attainable pressure.

AIRPLANE ENGINES

Air-Cooled Star Type. Air-Cooled Star-Type Aircraft Engines (Luftgekühlte Sternflugmotoren), Otto Günther. Motorwagen, vol. 25, no. 32, Nov. 20, 1922, pp. 608–611, 3 figs. The Bristol-Jupiter and Armstrong-Siddeley-Jaguar engines are described as examples of this type.

Fuel, High-Altitude Effect on. Results of Experimental Flights at High Altitudes with Daimler, Benz, and Maybach Engines to Determine Mixture Formation and Heat Utilization of Fuel, K. Kutzbach. Nat. Advisory Committee for Aeronautics, Tech. Notes, no. 125, Jan. 1923 11 pp., 12 figs. Translated from Technische Berichte, vol. 3, part 1.

Paris Show. Aeronautical Engines at the Paris Exposition. Aviation, vol. 14, no. 5, Jan. 29, 1923, pp. 132–133, 4 figs. Details of exhibits.

Rogers Air-Cooled. The Rogers B4 Air Cooled Engine. Aviation, vol. 14, no. 5, Jan. 29, 1923, p. 129, 1 fig. Light-weight power plant designed for durability and cheap upkeep.

Rolls-Royce Eagle IX. The Rolls-Royce Eagle IX Aero Engine. Aerial Age, vol. 16, no. 2, Feb. 1923, p. 63, 2 figs. Advantages over Eagle VIII model are enumerated.

Supercharging. Aero Engine Supercharging. Engineering, vol. 115, no. 2980, Feb. 9, 1923, pp. 165–166, 1 fig. Experimental work on effect of back pressure on engine power and efficiency.

AIRPLANE PROPELLERS

Shape. The Air Propeller, Its Strength and Correct Shape, H. Dietsius. Nat. Advisory Committee for Aeronautics, Tech. Notes, no. 127, Feb. 1923, 12 pp., 10 figs. Investigation of stresses. Author states that it is possible to give propeller such a shape that, under given conditions, viz., a definite speed of revolution and flying speed, bending stresses in blades assume quite an insignificant magnitude. Translated from Technische Berichte, vol. 3, part 2.

AIRPLANES

Albatros. The New Albatros Commercial Airplane "L 58" (Das neue Albatros-Verkehrsflugzeug "L 58"), G. Meyer. Motorwagen, vol. 25, no. 34, Dec. 10, 1922, pp. 648–650, 3 figs. Built for passenger and freight transportation, with seating capacity for six passengers in a closed cabin and two pilots. Characteristics: Engine, 220-hp. Rolls-Royce; weight empty, 1250 kg., loaded, 2130 kg.; speed, 165 km. per hr.; span, 15.94 m.; length, 10.874 m.; height, 3.826 m.

Auxiliary Sailplanes. An Auxiliary Sailplane has Flown. Aviation, vol. 14, no. 7, Feb. 12, 1923, p. 185, 4 figs. German Budig auxiliary sailplane has actually flown with its small 4-hp. B. M. W. engine.

Avro-Napier Bomber. The 1000 Hp. Avro-Napier Bomber, F. A. de V. Robertson. Aerial Age, vol. 16, no. 2, Feb. 1923, pp. 71–72, 3 figs. Engine is known as "Cub" and is property of Brit. Air Ministry; air plane is product of A. V. Roe & Co., Ltd.

Biplane Theory. General Biplane Theory, Max M. Munk. Nat. Advisory Committee for Aeronautics, Report no. 151, 1922, 47 pp., 9 figs. Deals with air forces on biplane cellule. 1st part deals with two-dimensional problem neglecting viscosity; 2nd part, with influence of lateral dimensions; 3rd part is intended for practical use and can be read without knowledge of 1st and 2nd parts. Tables and diagrams. Bibliography.

Carriers for. Powerful Airplane Carriers Building for U. S. Navy. Mar. Eng., vol. 28, no. 1, Jan. 1923, pp. 29–30, 1 fig. Electrically-driven battle cruisers Saratoga and Lexington being converted into floating airplane fields; will be capable of developing 180,000 hp. through four electrically driven shafts; speed 33 knots; length at waterline 850 ft.; beam 105 ft.

Commercial. The Design of Commercial Airplanes, E. P. Warner. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 155–159. Discusses design, with regard to economy, safety, speed and comfort. Size is debated, trend of progress being seemingly toward giant airplane.

Curtiss Oriole. The Curtiss Oriole for Aerial Photography. Aviation, vol. 14, no. 6, Feb. 5, 1923, pp. 154–155, 1 fig. Details of special airplane equipped for photography work used by Fairchild Aerial Camera Corp. for pictorial and mapping purposes.

Dayton Wright. Static Test of the Dayton Wright TA-3 Airplane, A. L. Morse. Air Service Information Circular, vol. 4, no. 388, Dec. 1, 1922, 27 pp., 42 figs. Conducted for purpose of determining structural strength of airplane. Results and recommendations.

Downwash of Wings. Downwash of Airplane Wings, Max Munk and Gunther Cario. Nat. Advisory Committee for Aeronautics—Technical Notes, no. 124, Jan. 1923, 9 pp., 9 figs. Results of tests to determine, under different conditions of flight, direction of air stream in wake of wings, which direction varies in general, at different points; description of test installation. Translated from Technische Berichte, vol. 3, part 1.

German. New German Commercial Airplanes (Neue deutsche Verkehrsflugzeuge), G. Mayer. Motorwagen, vol. 26, no. 1, Jan. 10, 1923, pp. 10–11, 1 fig. Details of L.F.G.-"V 27" monoplane, an express airplane for four passengers, equipped with B. M. W.-IIIa engine of 185 hp.

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 132

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Mchy. Corp'n

Aerial Tramways
(See Tramways, Wire Rope)

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Alternators
(See Generators, Electric)

Ammeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Ammonia Condensers, Fittings, etc.
(See Condensers, Fittings, etc., Ammonia)

Anchorages, Overhead Transmission
Midwest Steel & Supply Co.

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co

Arches, Boiler
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Baffle Walls, Boiler
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdy. & Mch. Co.
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Chain Link
(See Chain Belts and Links)

Belting, Conveyor
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Endless
Goodrich, B. F. Rubber Co.

Belting, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller-Bearing Co.

Binder (Lenix)
* Smidth, F. L. & Co.

Bleaching Machinery
Philadelphia Drying Machinery Co.

Blocks, Tackle
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Forge
* American Blower Co.
Clarage Fan Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blowers, Steam (Ring Type)
* McClave Brooks Co.

Blowers, Turbine
* Kerr Turbine Co.

Blueing
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Compounds
(See Compounds, Boiler)

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, Etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Murray Iron Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* Murray Iron Works Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien John Boiler Works Co.
* Titusville Iron Works Co.
Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Bolts, Stove (Steel)
* Reed & Prince Mfg. Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brewers' and Bottlers' Machinery
* Vilter Mfg. Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.

Bridgewalls (Furnace)
McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
* Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.
Todd Shipyards Corp'n

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Burrs (Steel, Brass & Copper)
* Reed & Prince Mfg. Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equipment & Engrg. Co.

Cable Railways
(See Railways, Cable)

Cable Wire
(See Rope, Wire)

Cables, Electrical
(See Wire & Cables, Electrical)

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Helicopters. See HELICOPTERS.

Japanese. Representative Japanese Civil and Military Aircraft. Aviation, vol. 14, no. 6, Feb. 5, 1923, pp. 163–164, 6 figs. Details of several types.

Junkers. The Junkers All Metal Monoplane. Flight, vol. 15, no. 3, Jan. 18, 1923, pp. 35–38, 13 figs. Cantilever wing machine with wing placed low on fuselage, equipped with 180-hp. low-compression B.M.W. engine.

Model Tests. Tests on an Airplane Model. AEG D I of the Allgemeine Elektricitats Gesellschaft, A.-G., Airplane Construction Section, Conducted at the Gottingen Model Testing Laboratory for Aerodynamics, Max Munk and Wilhelm Melthan. Nat. Advisory Committee for Aeronautics, Tech. Notes, no. 128, Feb. 1923, 29 pp., 9 figs. Results of tests carried out in small wind tunnel of Gottingen establishment. Translated from Technische Berichte, vol. 3, part 2.

Monoplanes. Three New Small L. F. G. Airplanes (Drei neue kleine L. F. G.-Flugzeuge). G. Mayer. Motorwagen, vol. 25, no. 32, Nov. 20, 1922, pp. 614–617, 3 figs. Details of three light-engined, strutless monoplanes built by the Luft Fahrzeug-Gesellschaft, Berlin.

Paris Show. New Aircraft at the Paris Aero Exposition. Aviation, vol. 14, nos. 6 and 7, Feb. 5 and 12, 1923, pp. 156–160 and 190–191, 16 figs. Review of constructional features and specifications of aircraft exhibited.

The Paris Show Alphabetical Report. Aeroplane, vol. 23, nos. 25 and 26, Dec. 20 and 27, 1922, pp. 466–480 and 488–498, 26 figs. Description of airplane exhibits.

Seaplanes. See SEAPLANES.

Soaring Principles Applied to. Application of Soaring Machine Practice to Airplane Design. Benno R. Dierfeld. Automotive Industries, vol. 48, no. 7, Feb. 15, 1923, pp. 332–336, 7 figs. Study of gliders in recent trials indicates that builders of propelled aircraft may adapt some construction ideas; light sport plane likely development; engine would carry plane to height at which soaring would be possible.

Transport, Specifications for. Design Competition for Transport Airplane. Aviation, vol. 14, no. 4, Jan. 22, 1923, pp. 94–96. Air Service asks for bids on Liberty-engined 8 passenger carrier with speed of 105 mi. per hr. Specifications.

Types, British. The British Aircraft Industry of 1922. Aeroplane, Dec. 1922 (Special Foreign Issue), 71 pp., 65 figs. Description of most important products of leading firms. (In English, French and Spanish).

AIRSHIPS

Hull Design. Characteristics of Streamline Forms and Design Data for Airship Hulls. Thos. L. Blakemore and Ollie L. Lewis. Air Service Information Circular, vol. 1, no. 39, Nov. 1, 1922, 17 pp., 4 figs. Determination of most efficient streamline form for airship hulls from comparative study of characteristics; and investigation of relative efficiencies of all such forms on which data were available, based upon specifications and reports of wind-tunnel tests on models of same.

Limits of. Determining Economical and Constructional Limits of Airships. G. Arturo Crocco. Aviation, vol. 14, no. 7, Feb. 12, 1923, pp. 184–185, 1 fig. Includes diagram showing limits of airships.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Bronze. See BRONZES.

Calite. Calite An Ideal Alloy for Structural Parts That Must Withstand High Heat. Raw Material, vol. 6, no. 1, Jan. 1923, pp. 6–9, 3 figs. Advantages in industry and wide range of usefulness.

German Silver. Concerning the Manufacture of German Silver for Pressing and Free Cutting. Leon Kroll. Brass World, vol. 18, no. 12, Dec. 1922, pp. 349–351. Results from author's practical experience in Swiss establishments; phenomena encountered in manufacture, and manipulation of the alloy.

Zinc-Base Die-Casting. A New Zinc-Base Die-Casting Alloy, Charles Pack. Metal Industry (N. Y.), vol. 21, no. 2, Feb. 1923, pp. 53–54, 3 figs. Alloy known as ni-chro-zink, which is non-corrosive and does not swell up or warp.

ALUMINUM ALLOYS

Aluminum-Silicon. Thermal Properties of Aluminum-Silicon Alloys, Junius D. Edwards. Chem. & Met. Eng., vol. 28, no. 4, Jan. 24, 1923, pp. 165–169, 5 figs. Accurate determination of densities of aluminum alloys containing variable amounts of silicon; data at various temperatures up to 1000 deg. cent., and on crystallization shrinkage and tendency to form pipe.

Castings, Use in. Aluminum Alloys and Their Use in Castings. Raw Material, vol. 6, no. 1, Jan. 1923, pp. 24–34, 1 fig. Survey of various aluminum alloys with exception of silicon alloys which have become commercially important; suggestions for turning out meritorious aluminum-alloy castings.

ASH HANDLING

Methods. Methods of Ash Handling. John Hunter and Alfred Cotton. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 83–91 and (discussion) 91–92, 24 figs. Describes various methods, dealing specially with stationary practice. Methods of removing ashes from boiler rooms; design, construction and capacity of hopper ashpits, including doors and water seals; systems of mechanical conveyance and elevation, comprising ash cars, skip hoists and bucket conveyors; fluid conveyance, as represented by water sluicing and steam-jet conveyors; particulars of ash bunkers and settling basins. (Abridged.)

Moist Fuels. Moist Fuels Present Ash Handling Difficulties. Zuce Kogan. Power Plant Eng., vol. 27, no. 3, Feb. 1, 1923, pp. 162–164, 6 figs. Methods of removing ash, combating clinker formation and preventing soot accumulation on boiler heating surfaces.

Steam Jet Conveyor. The Steam Jet Conveyor for Handling Ashes. Gas Engr., vol. 39, no. 561, Jan. 1923, pp. 9–11, 4 figs. Details of design and operation, and disadvantages.

AUTOGENOUS WELDING

Bronze Bell. Welding of a Large Bronze Bell (Die Schweissung der grossen Bronzeglocke im Dom zu Berlin). Lothar Sommerfeldt. Autogene Metallbearbeitung, vol. 15, no. 24, Dec. 15, 1922, pp. 341–347, 4 figs. Describes successful welding of crack in bell weighing 3500 kg., at Berlin cathedral. See also description by Adolf Felix in Zeit. fur diegesamte Giessereipraxis, vol. 44, no. 1–2, Jan. 13, 1923, pp. 1–4, 4 figs.

Railway Shops. Autogenous Welding at Sacramento General Shops of the Southern Pacific Company. H. J. McCracken and F. J. Hickey. Am. Welding Soc.—Jl., vol. 2, no. 1, Jan. 1923, pp. 10–20, 16 figs. Notes on repairing boiler tubes; boilers, varied articles in machine shops, and castings in steel foundry.

AUTOMOBILE ENGINES

Air Cooling. The Progress of Air-Cooling. Autocar, vol. 50, no. 1422, Jan. 19, 1923, pp. 94–96, 4 figs. Success of two-cylinder-engined cars, and possibility of adoption of air cooling on four-cylindered power units; criticisms of air cooling; comparison of air-cooled twin with water-cooled four.

Bi-fuel Use in. Alcohol as a Fuel. Autocar, vol. 49, no. 1419, Dec. 29, 1922, pp. 1310–1311, 2 figs. Process of utilization of bi-fuels scheme, which makes possible use of two different types of fuel, gasoline and alcohol, in same engine.

Camshaft Generating Machines. The Hotchkiss-Taylor Camshaft Generating Machine. Machy. (Lond.), vol. 21, no. 540, Feb. 1, 1923, pp. 551–553, 3 figs. Production of cam profiles on automobile camshafts.

Charging Two-Stroke. The Charging of Two-Stroke Engines. W. Morgan. Automobile Engr., vol. 13, no. 172, Jan. 1923, pp. 24–31, 26 figs. Discussion restricted mainly to two-stroke engines with crankcase compression. Object in view is to raise value of brake mean effective pressure attained approximately to that given by a good four-stroke engine at equal piston speeds, with reasonable adherence to simplicity of actuation.

High-Speed. Recent Automobile Engines (Vom neuzeitlichen Kraftwagen). Karl Schirmbeck. Motor u. Auto, vol. 19, no. 23–24, Dec. 20, 1922, pp. 288–293, 5 figs. Development of high number of r.p.m., difficulties it introduces and how to overcome them.

Lo Presti. Modern Explosion Engines for Automobiles and Aviation (Motori a scoppio moderni per auto e aviazione). Michele Lo Presti. Industria, vol. 36, no. 23, Dec. 15, 1922, pp. 445–447, 5 figs. Describes Lo Presti explosion engine, and its recent improvements; weighs under 800 grams per horsepower.

Non-Pinker. The Hobson Non-Pinker. Auto-Motor Jl., vol. 28, no. 2, Jan. 11, 1923, p. 34, 2 figs. New device which allows of water being used in place of benzol, and gives same effect as regards prevention of pinking as is obtained by gasoline-benzol mixtures with better effect and increased economy.

Two-Cycle. New Two-Cycle Engine for Vehicles. H. Heller. Eng. Progress, vol. 4, no. 2, Feb. 1923, pp. 33–34, 5 figs. Difficulties of two-cycle design; new engine invented by J. Lorbach works without valves, only with slots.

Possibilities for Improvement of Two-Stroke Cycle Engines (Verbesserungs-Möglichkeiten fur Zweitaktmotoren). Gustav Künzel. Motorwagen, vol. 25, no. 32, Nov. 20, 1922, pp. 611–614, 7 figs. It is shown that it is possible to build two-stroke engines of good efficiency and without complications.

Valve Guides. Improvements in Valve Gear. Autocar, vol. 50, no. 1422, Jan. 19, 1923, p. 84, 2 figs. Describes Smith floating valve guide, which ensures accurate seating of poppet valve, and Akehurst valve mechanism.

Waukesha. Unusual Fuel Economy a Feature of New Waukesha Engine. Commercial Vehicle, vol. 27, no. 11, Jan. 1, 1923, pp. 21–23, 5 figs. Describes new commercial vehicle engine, 4 by 5¾ in.; efficiency of more than 110 ton-miles to gallon; increased compression ratio factor in operating efficiency of new model.

[See also IGNITION.]

AUTOMOBILE FUELS

Carburation. A New System of Carburation. G. Keith and W. A. Whatmough. Automobile Engr., vol. 13, no. 173, Feb. 1923, pp. 55–59, 14 figs. System described is development of system of quality control of combustible mixtures of gas and air which has been successfully applied in gas-furnace practice since 1915; application of principles to fuel supply of internal-combustion engines. Paper read before Instn. Automobile Engrs.

Charcoal Producer Gas. Hungary Uses Charcoal Producer Gas as Truck Fuel. J. E. Kirchner. Automotive Industries, vol. 48, no. 6, Feb. 8, 1923, pp. 283–284, 4 figs. Fiat trucks in service by Hungarian state railroads equipped with gas producers, located at side of driver's seat; cost of operation with charcoal is 16 per cent of that with gasoline.

[See also GASOLINE.]

AUTOMOBILE INDUSTRY

Service Coöperation. Automotive-Service Coöperation Between Manufacturer and Dealer. J. F. Page. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 205–206. Notes on field conditions; stock-department supervision; factory car inspections.

AUTOMOBILES

Aster. The "Eighteen Six Aster." Auto-Motor Jl., vol. 28, no. 2, Jan. 11, 1923, pp. 27–30, 11 figs. Monobloc engine has 69.5-mm. bore and 115-mm. stroke; chassis of 5-seater touring car weighs 16½ cwt.

Bean. The Bean Car. Auto-Motor Jl., vol. 28, no. 1, Jan. 4, 1923, pp. 7–10, 12 figs. Engine is monobloc construction so far as cylinders are concerned with big detachable water head; 11.9-hp. car produced at reasonable price with comprehensive equipment.

Belsize. The 1923 9 Hp. Belsize Car. Auto-Motor Jl., vol. 28, no. 3, Jan. 18, 1923, pp. 47–49, 8 figs. Vehicle with oil-cooled engine.

Bodies. Cheaper Closed-Body Construction. George J. Mercer. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 213–216, 6 figs. Statistics relating to proportion of closed to open bodies and changes that have taken place in body construction in recent years. Describes unconventional type of body, covered entirely with fabric over foundation of wire mesh and buckram fastened to conventional wood framing, and points out its advantages.

Brakes. Automobile Braking (Le freinage des automobiles). E. Weiss. Nature, no. 2540, Dec. 9, 1922, pp. 369–372, 8 figs. Discusses differential, servo, hydraulic, pneumatic, etc., brakes, placed on rear or front axles, and their control.

Braking. Distances Required for Stopping. P. M. Heldt. Automotive Industries, vol. 48, no. 6, Feb. 8, 1923, pp. 280–281, 1 fig. Application of brakes produces effect of transferring weight from rear to front wheels; stopping time less with four-wheel type; effect of air resistance.

Brussels Show. The Brussels Show. Autocar, vol. 50, no. 1422, Jan. 19, 1923, pp. 97–99, 5 figs. Notes on exhibits at Belgian Automobile Show; popularity of 2-liter family cars.

Citroën Caterpillar. The Sahara Conquered by Car. Autocar, vol. 50, no. 1421, Jan. 12, 1923, pp. 58–60, 8 figs. Describes Citroën cars, equipped with Kegresse-Hinstin systems of flexible rubber and canvas creeper track, which have crossed the Sahara, from Touggourt to Timbuctoo, in twenty-two days; special cooling arrangements; six-speed arrangement. See also article in Autocar, vol. 50, no. 1422, Jan. 19, 1922, pp. 102–103, 3 figs., describing performance.

Design. Relative Movements Between Axle and Frame. F. A. Stepney. Automobile Engr., vol. 18, no. 172, Jan. 1923, pp. 9–10, 4 figs. Location of brake, steering, and similar connections. Discusses design of axle and chassis so as to have least possible endwise movement.

Developments. Passenger-Car Developments and Prophecies. F. E. Watts. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 177–178. Review of important developments, most important of which is said to be adaptation of closed body to cheap quantity production.

Differential Casings. Machining Differential Housings on a Production Basis. H. A. Loudon and H. S. Beal. Automotive Industries, vol. 48, no. 5, Feb. 1, 1923, pp. 234–237, 10 figs. Outlines practical methods.

Franklin. The New Six-Cylinder Franklin Chassis. Automobile Engr., vol. 13, no. 173, Feb. 1923, pp. 34–41, 16 figs. Latest model of air-cooled car.

Fuel-Consumption Indicators. Fuel Consumption Indicators. Autocar, vol. 50, no. 1420, Jan. 15, 1923, pp. 21–23, 5 figs. Instruments which show at glance fuel consumption in miles per gallon at any instant; various methods suggested for attaining desired result.

Gasoline Gage. A Magnetic Petrol Gauge. Auto-Motor Jl., vol. 28, no. 3, Jan. 18, 1923, pp. 53, 4 figs. Electric device which shows reading on dashboard and is applicable to any gasoline system.

German Faun. New Faun Good Example of Modern German Light Car Design. Automotive Industries, Vol. 48, no. 7, Feb. 15, 1923, pp. 324–328, 6 figs. 4-cylinder engine with piston displacement of 86.5 cu. in. is used; detachable aluminum cylinder head; overhead camshaft.

Headlights. British Encourage Development of Non-Glare Headlamps. M. W. Bourdon. Automotive Industries, vol. 48, no. 7, Feb. 15, 1923, pp. 329–330, 2 figs. "Moonbeam" lamp with ellipsoidal reflector, narrow opaque shield in focal plane and lens with vertical corrugations on its rearward surface wins medal of Roy. Automobile Club of Great Britain.

Moonbeam Non-Dazzle Headlamps. Auto-Motor Jl., vol. 28, no. 2, Jan. 11, 1923, pp. 33, 2 figs. Optical principle used to control objectionable glare; system comprises reflector of special shape, projecting lens and cross-bar or diaphragm.

Lavoie. New Canadian Chassis Is Replete with Engineering Interest, Herbert Chase. Automotive Industries, vol. 48, no. 4, Jan. 25, 1923, pp. 177–184, 11 figs. Lavoie closed cars fitted with 4-wheel interchangeable brakes, live front axle spindles and novel design of steering gear; 4-cylinder engine has unjacketed detachable head.

Lea-Francis. The Lea-Francis 8.9 Hp. Light Car. Auto-Motor Jl., vol. 27, no. 52, Dec. 28, 1922, pp. 1111–1113, 10 figs. Engine is monobloc 4-cylinder with clutch and gear integral as one-unit power plant and transmission.

* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Car Hauls, Cable and Chain
Link-Belt Co.

Cars, Charging
Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Case-hardening
* American Metal Treatment Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* United States Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co.

Castings, Brass
DuPont Engineering Co.

Castings, Die-Moulded
* Doehler Die-Casting Co
Veeder Mfg. Co.

Castings, Gray Iron
DuPont Engineering Co.

Castings, Heavy
* United States Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
* Cole, R. D. Mfg. Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* McClave Brooks Co.
* Roversford Fdry. & Mch. Co.
* Pittsburgh Valve Fdry. & Const. Co.
* United States Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Vogt, Henry Machine Co.

Castings, Steel
Mackintosh-Hemphill Co.

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugal Blowers, Pumps
(See Blowers, Pumps, etc., Centrifugal)

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
* Chain Belt Co.
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chain Grate Stokers
(See Stokers, Chain Grate)

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corp'n

Charging Machines
Whiting Corp'n

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Steel
(See Stacks, Steel)

Chucking Machines
* Jones & Lamson Machine Co
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Hendrick Mfg. Co.

Chutes, Gravity
Link-Belt Co.

Cinder Mills
(See Mills, Cinder)

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Clamps, Wire Rope
(See Wire Rope Fastenings)

Cloth, Rubber
Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
* Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Electric Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Pittsburgh Valve Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg Co. and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Link-Belt Co.
* Medart Co.
* Roversford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compounds, Boiler
Unisol Mfg. Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
Novo Engine Co.
* Titusville Iron Works Co.
Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Concrete Hardener
Sonneborn, L. Sons (Inc.)

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* United States Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.
* Simplex Valve & Meter Co.

Converters, Steel
Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
* Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Foundry & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
*Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
* Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.

Conveyors, Gravity (Roller)
Link-Belt Co.

Conveyors, Ice
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
* Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Coolers, Brine
* Frick Co. (Inc.)

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Corliss Engines
(See Engines, Steam, Corliss)

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Couplings, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Fawcus Machine Co
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
* Medart Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Roversford Foundry & Machine Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Union
(See Unions)

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Loyd-Lord. The Loyd-Lord 12-20 Hp. Car. Auto-Motor Jl., vol. 27, no. 50, Dec. 14, 1922, pp. 1067-1069, 12 figs. Engine is of 11.9 R.A.C. rating, 69 mm. bore by 120 mm. stroke, with cubic capacity of 1795 cc. General description.

Manufacture. Some Interesting Production Methods. Automobile Engr., vol. 13, no. 173, Feb. 1923, pp. 45-51, 22 figs. Examples of works practice of Standard Motor Co., Coventry.

N. P. The N. P. Car. Auto-Motor Jl., vol. 28, no. 5, Feb. 1, 1923, pp. 87-89, 10 figs. Detailed description of light car of conventional lines; Meadows 4-cylindered engine with overhead valves; two different powers provided, 12-16 hp. and 14-22 hp.

Racers. Racing Automobiles (Rennwagen), J. Schwenecker. Motorwagen, vol. 25, no. 35, Dec. 20, 1922, pp. 663-668. Review of present status and consideration of technical problems. It is pointed out that racing and series automobiles must have an entirely different evaluation.

Scottish Show. The Scottish Motor Exhibition. Autocar, vol. 50, no. 1423, Jan. 26, 1923, pp. 134-147, 17 figs. Brief description of exhibits at Glasgow.

Service System. The Development of a Modern Service System, Don T. Hastings. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 193-204, 16 figs. Enumerates causes of poor service, describes new attitude toward service and progress of building up of combined flat rate and piece-work system.

Vauxhall. The Three-Litre Vauxhall Racing Engine, Harry R. Ricardo. Automobile Engr., vol. 18, no. 172, Jan. 1923, pp. 2-8, 13 figs. Four-cylinder engine, each of 85 mm. bore and 132 mm. stroke, designed to run continuously at from 4000 to 4500 r.p.m., with short periods up to 5000 r.p.m.; details of design and performance tests.

AVIATION

Aerial Lighthouses. Improved Equipment for Night Flying. Aviation, vol. 14, no. 5, Jan. 29, 1923, pp. 130-131, 1 fig. Describes field limitation beacon and ground wind indicator developed by Am. Gas Accumulator Co., showing limits of field and direction of wind.

Landing Lights for Aircraft. Times Trade & Eng. Supp., vol. 11, no. 231, Dec. 9, 1922, p. 305, 1 fig. New combined lighthouse and airdrome landing light of French design.

Airports. Airports in the United States and Possessions. Aviation, vol. 14, nos. 3 and 4, Jan. 15 and 22, 1923, pp. 68-72 and 98-103, 5 figs. How airport should be built; size and shape; character of ground. List of permanent and temporary American airports.

Commercial, France. Progress of Commercial Aviation in France, W. W. Kellett. Aviation, vol. 14, no. 5, Jan. 29, 1923, p. 125. Account of progress.

Gliding. Engineless Airplanes (L'avion sans moteur), Sufrin Hebert. Technique Moderne, vol. 15, no. 1, 1923, pp. 11-16, 7 figs. General review of developments; study of air currents and how to make use of them.

German Gliding Achievements and the Long-Distance Flight Problem (Deutsche Segelfluge und das Fernflug-Problem), H. Werner. Motorwagen, vol. 25, no. 35, Dec. 20, 1922, pp. 671-672. Discusses future possibilities of development.

Landing-Field Nomenclature. Proposed Landing Field Nomenclature, Archibald Black and Donald R. Black. Aviation, vol. 14, no. 7, Feb. 12, 1923, pp. 188-189.

B

BALANCING MACHINES

Rotating Parts. Balancing Rotating Parts While Running at Regular Speed (Dispositif permettant l'équilibrage des pièces tournantes "en cours de rotation à leur vitesse de régime"), Jacques Roquet. Revue Générale de l'Electricité, vol. 12, no. 26, Dec. 30, 1922, pp. 1013-1016, 8 figs. Deals especially with balancing of rotors of turbo-generators, and describes apparatus consisting of two balancing disks placed at each end.

Static-Dynamic. The Olsen-Carwen Static-Dynamic Balancing Machine, C. Norman Fletcher. Machy. (Lond.), vol. 21, no. 539, Jan. 25, 1923, pp. 513-516, 9 figs. Designed so that by simple manipulation, static unbalance of a body can be ascertained.

Technology. The Present Status of Balancing Technology (Der heutige Stand der Auswuchttechnik), Ernst Lehr. Maschinenbau, vol. 2, no. 5-6, Dec. 16, 1922, pp. G62-G69, 15 figs. Presentation of methods on an exact scientific basis. The Lawaczeck-Heymann system of balancing machines.

BEARINGS

Lubrication. Reducing Lubrication Costs, H. M. Robinson. Elec. Ry. Jl., vol. 61, no. 3, Jan. 20, 1923, pp. 119-122, 8 figs. Methods of lubrication and amount of lubricant used on various types of motor and journal bearings on rolling stock of Northern Texas Traction Co. and Tarrant County Traction Co., Fort Worth, Tex.

BEARINGS, BALL

Economy of. Ball Bearing Installation Nets 50% on Investment, Chester A. Gauss. Belting, vol. 22, no. 1, Jan. 1923, pp. 26, 28, 30 and 32, 9 figs. Economics which can be effected through change over to ball-bearing lineshaft equipment. Describes equipment of Hubbard Milling Co., Mankato, Minn., and savings effected.

Roller and. Experience With Ball and Roller Bearings in Railway Rolling Stock (Erfarenheter rörande kul- och rullager i järnvägsmateriel), Arvid Palmgren. Teknisk Tidskrift, vol. 53, no. 3, Jan. 20, 1923, pp. (Mekanik Section) 1-6, 10 figs. Behavior of ball and roller bearings and results of comparative tests.

The Elimination of Power Losses and Other Sources of Waste in Mines by the Use of Ball- and Roller-Bearings, Kenelm C. Appleyard and A. W. MaCaulay. Instn. Min. Engrs.—Trans., vol. 64, part 4, Jan. 1923, pp. 154-170 and (discussion) 170-172, 8 figs. Account of tests showing power saving.

BEARINGS, ROLLER

Railway Vehicles. Roller Bearings for Railway Vehicles. Ry. Engr., vol. 44, no. 516, Jan. 1923, pp. 10-11, 4 figs. Recent developments on New York Central lines.

Street Cars. Tests of London Country Council Car Fitted With Roller Bearings. Tramway & Ry. World, vol. 53, no. 3, Jan. 18, 1923, pp. 25-27, 6 figs. Describes comparative tests carried out by Nat. Physical Laboratory with car before and after replacement of plain bearings of motors and axles by Hoffmann roller bearings, and results obtained.

BELT DRIVE

Calculations. Transmission Belt Operation (Le fonctionnement des transmissions par courroies). Métallurgie, vol. 54, no. 51, Dec. 21, 1922 and vol. 55, no. 2, Jan. 11, 1923, pp. 1907-1908 and 53-54. Belt calculations; measuring coefficient of friction and belt efficiency; theory of functioning of belts, based on formula by Rankine.

Standardization. DuPont Method of Analyzing and Standardizing Belt Drives, William Stantar. Belting, vol. 21, no. 6, Dec. 1922, pp. 25-28, 2 figs. How this organization determined by actual tests proper belts to use and what it saved by doing so.

BELTING

Leather. Relation of Leather Belting to Economical Power Transmission, Claude O. Streeter. Agricultural Eng., vol. 3, no. 12, Dec. 1922, pp. 199-200. Results of tests show superiority of leather belting.

BLAST-FURNACE GAS

Cleaning. The Trend in Blast Furnace Gas Cleaning, Fred E. Kling. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 44-46, 2 figs. Controversy between "wet cold" and "dry cold" still waging; comparison between American and foreign equipment and costs.

BLAST FURNACES

Design. New Blast Furnace at Clarence Ironworks. Iron & Coal Trades Rev., vol. 106, no. 2865, Jan. 26, 1923, pp. 111-114, 8 figs. Details of furnace built by Head, Wrightson & Co., Ltd.; height is 85 ft.; hearth, 12 ft. 6 in. in diam.

North China. First Modern Blast Furnace in North China, Paul F. Kohlhaas. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 37-43, 11 figs. Lungyen Mining Administration completes 250-ton furnace within 9 mi. of Pekin; built largely of American equipment by American engineers, but by Chinese labor.

Operations 1922. Blast Furnace Operations During the Year, J. A. Mohr. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 32-34, 1 fig. General tendencies; heat wastes being corrected; recent installations; foreign competition.

BOILER EXPLOSIONS

Marine. Vertical Type Boiler Explodes on a British Ship. Boiler Maker, vol. 23, no. 1, Jan. 1923, pp. 8-9, 1 fig. Details of Board of Trade investigation with conclusions.

BOILER FEEDWATER

Degassing. Kestner System for the De-gassing of Boiler Feed Water. Iron & Coal Trades Rev., vol. 106, no. 2864, Jan. 19, 1923, pp. 84-85, 3 figs. Describes apparatus and application of system.

Heating. Feed Heating for High Thermal Efficiency, Linn Helander. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 105-109, 11 figs. Economies of 25,000-kw. power stations using single- and multiple-stage condenser heaters, with and without economizers, determined for purpose of demonstrating effect of varying feedwater temperature. (Abridged.)

Feed-Water Heaters, Water Softeners and Purifying Systems. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 77-86, 18 figs. Advantages of heating water before delivering to furnace; methods of heating boiler feedwater; insulating feedwater heater; economizers; mechanical, thermal, and chemical treatment of feedwater; types of purifiers.

Treatment. Determination of Hardness of Water (Die Härtebestimmungen in technischen Wässern), Franz Kanhäuser. Chemiker-Zeitung, vol. 47, no. 8, Jan. 18, 1923, pp. 57-59. Reviews processes for treating boiler feedwater and shows most appropriate method for a given water.

Feed Water Cleaning Without Lime, H. Frey. Eng. Progress, vol. 4, no. 2, Feb. 1923, pp. 28-29, 1 fig. Describes Roku water purifier, which aims more particularly at precipitating scale-forming substances by means of heating.

BOILER FURNACES

Draft, Mechanical. Mechanical Draft. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 72-76, 15 figs. Advantages; discusses induced and forced draft.

BOILER INSPECTION

Insurance and. Inspection and Insurance of Steam Boilers, R. J. Furr. Boiler Maker, vol. 23, no. 1, Jan. 1923, pp. 16-18 and 22. Outlines fundamental principles of insurance, qualifications of inspectors and details of external and internal inspections.

BOILER OPERATION

Efficiency Calculation. Special Slide Rule Designed to Calculate Boiler Efficiency, C. H. S. Tupholme. Power Plant Eng., vol. 27, no. 3, Feb. 1, 1923, pp. 165-166, 2 figs. Calculator brought out by British firm consists of two slide rules working in usual direction and fitted into one frame.

Factors Determining. Determining Boiler Operating Factors, D. C. Hess. Blast Furnace & Steel Plant, vol. 11, no. 2, Feb. 1923, pp. 169-172, 6 figs. Methods used to determine essential factors for economical operation of boiler rooms; results of tests; method of calculating combined efficiency of furnace and grate; operating charts.

Feeders. The Selection of Boiler Feeders, H. A. Shultz. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 114-117, 2 figs. Centrifugal pumps now possess reliability of reciprocating boiler feeders plus economy in space required.

Furnace Firing. Determining Boiler Operating Factors, D. C. Hess. Am. Gas Jl., vol. 117, no. 29, Dec. 16, 1922, pp. 679-683, 8 figs. Data produced by series of tests. Heat-balance calculations; cost of steam curves; factors for firing furnaces.

Gas Works. Boiler House Practice in Gas Works. Gas Engr., vol. 39, no. 561, Jan 1923, pp. 5-8. Discusses softening of boiler feedwater and control of combustion, as ways of attacking problem of increasing efficiency of steam production.

BOILER PLANTS

Coal Mines. Fuel Economy in Colliery Steam Plant, Arthur Grounds. Instn. Min. Engrs.—Trans., vol. 64, part 4, Jan. 1923, pp. 137-146, 2 figs. Discusses conditions necessary for economical operation of boiler plants. Paper before Manchester Geol. & Min. Soc.

Oil-Burning. Where Steam Gets 84.1 Per Cent of Heat in Fuel, G. Milton Levy. Power Plant Eng., vol. 27, no. 3, Feb. 1, 1923, pp. 157-161, 7 figs. Plant of Atlantic Refining Co. equipped to burn oil, coal or gas; instruments permit weekly calculation of heat balance.

Wood-Refuse-Burning. Wood Refuse Power Plant. Engineering, vol. 115, no. 2977, Jan. 19, 1923, pp. 69-71, 5 figs. New installation built by Horace Boot & Partners, London, for timber mills, uses as its sole fuel sawdust and wood obtained from works.

BOILER PLATE

Investigations. Report on Investigations of Boiler Plate at the Material Testing Institute (Mitteilung aus der Materialprufungsanstalt an der Technischen Hochschule Stuttgart), H. Baumann. Zeit. des Bayerischen Revisions-Vereins, vol. 26, no. 24, Dec. 31, 1922, pp. 1191-1194, 4 figs. Account of work extending over a number of years. Address before Federation German Boiler Inspection Societies at Stuttgart.

BOILER ROOMS

Piping. Boiler-Room Piping. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 93-99, 10 figs. Details of design, laying, and size; tables giving sizes of standard, extra-strong, and double-strong pipe, respectively.

BOILER TUBES

Soot Blowers. Boiler Efficiency and Soot Removal. Eng. Rev., vol. 36, no. 5, Nov. 1922, pp. 140-142, 4 figs. Description of modern equipment for removal of soot from tubes of marine and land boilers by means of steam jet.

BOILERS

Accessories. Boiler Accessories. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 12-26, 35 figs. Discusses safety valves, and formulas for safety valves; pressure gages; water columns and water gages; fusible plugs; blowoff valves and pipes; damper regulators; safety non-return valves; recording instruments; steam flow meters; boiler-room packings.

Care and Management. Care and Management of Steam Boilers. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 5-11, 16 figs. Selection of boiler room personnel; discusses ascertaining and maintaining water level, starting fires and raising steam, feeding and heating feedwater, pressure indicating and regulating devices, how to proceed in emergencies, soot removal, firing methods, stokers, coal and ash handling, etc.

Ice Plants. Steam Boilers and Accessories for Ice Making Plants, W. D. Dunbar. Ice & Refrigeration, vol. 63, no. 6, Dec. 1922, pp. 337-339. Discusses furnaces, stokers, baffling of boilers, draft, etc., from standpoint of economical generation of power. (Abstract.) Paper read before Nat. Assn. Practical Refrig. Engrs.

Rating. Capacity, Methods of Rating and Horsepower of Boiler. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 66-71, 1 fig. Details of economical operation. Relation of boiler horsepower to engine horsepower; depreciation and obsolescence; evaporation.

Setting. Boiler Setting. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 33-40, 10 figs. Describes settings required for different-type boilers; construction of boiler settings; tables giving measurements for setting different-type boilers; characteristics of firebrick.

Strength and Safe Pressures. Strength of Boiler and Safe Pressures. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 60-65, 15 figs. Rules and formulas covering problems generally met with in examinations, for determining thickness and strength of principal parts of boilers and pressures that may safely be carried.

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corp'n

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corp'n

Cranes, Locomotive
* Brown Hoisting Machinery Co.
Link-Belt Co.
Whiting Corp'n

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Crank Shafts
Link-Belt Co.

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
* Fuller-Lehigh Co
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Roll
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cupolas
* Bigelow Co.
Northern Engineering Works
Whiting Corp'n

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
Haynes Stellite Co.
* Whitney Mfg. Co.

Cylinders Rebored
* Hooven, Owens, Rentschler Co.

Damper Regulators
(See Regulators, Damper)

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Diaphragms, Rubber
United States Rubber Co.

Die Castings
(See Castings, Die Moulded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Blanking
* Bliss, E. W. Co.

Dies, Punching
* Bliss, E. W. Co.

Dies, Sheet Metal Working
* Bliss, E. W. Co.

Dies, Thread Cutting
Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Drafting Room Furniture
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Drawing Instruments
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Drawing Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Lidgerwood Mfg. Co.
* Morris Machine Works

Dredging Sleeve
United States Rubber Co.

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.
* Ingersoll-Rand Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
* Johns-Manville (Inc.)
Manufacturing Equipment & Engrg. Co.

Drop Forgings, Hammers, etc.
(See Forgings, Hammers, etc., Drop)

Dryers, Coal (Centrifugal)
Link-Belt Co.

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.
Link-Belt Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Philadelphia Drying Machinery Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
Clarage Fan Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.

Dustproofing Materials
Sonneborn, L. Sons (Inc.)

Dyeing Machinery
Philadelphia Drying Machinery Co.

Dynamic Balancing Machines
(See Balancing Machines, Dynamic)

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Electric Generators, Hoists, Trucks Welding, etc.
(See Generators, Hoists, Trucks, Welding, etc., Electric)

Electric Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Electric Measuring Instruments
(See Instruments, Electrical Measuring)

Electric Supplies
* General Electric Co.
* Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
* Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Elevators, Electric
Northern Engineering Works

Elevators, Hydraulic
Whiting Corp'n

Elevators, Inclined
Link-Belt Co.

Elevators, Passenger and Freight
Northern Engineering Works

Elevators, Pneumatic
Whiting Corp'n

Elevators, Portable
Link-Belt Co.

Elevators, Telescopic
Link-Belt Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.

Engine Stops
* Schutte & Koerting Co.

Engineers, Consulting
(See Professional Engineering Service Section)

Engines, Blowing
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Novo Engine Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.

Engines, Gasoline
* Climax Engineering Co.
Novo Engine Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
Clyde Iron Works Sales Co.
* Hooven, Owens, Rentschler Co.
* Lidgerwood Mfg. Co.
* Morris Machine Works

Engines, Kerosene
* Climax Engineering Co.
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Climax Engineering Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
Sterling Engine Co.
* Ward, Chas. Engineering Wks.
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
* Ingersoll-Rand Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Otto Engine Works
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Climax Engineering Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Morris Machine Works
Sterling Engine Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Ridgway Dynamo & Engine Co
* Titusville Iron Works Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Foundry & Machine Works
* Leffel, James & Co.
* Troy Engine & Machine Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
Harrisburg Foundry & Machine Works
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Vilter Mfg. Co.

Engines, Steam, High Speed
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Foundry & Machine Works

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Vilter Mfg. Co.

Engines, Steam, Throttling
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
Harrisburg Foundry & Machine Works
* Ridgway Dynamo & Engine Co.
Stumpf Una-Flow Engine Co (Inc.)

Engines, Steam, Variable Speed
* Brownell Co.
Harrisburg Foundry & Machine Works

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
Clarage Fan Co.

Exhausters, Gas
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Expansion Joints
(See Joints, Expansion)

Extractors, Centrifugal
Tolhurst Machine Works

Extractors Oil and Grease
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Factory Equipment, Metal Manufacturing
Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Machinery Co.

Fans, Exhaust, Mine
* American Blower Co.
Clarage Fan Co.

Feed Water Circulators, Heaters, Heaters and Purifiers, etc.
(See Circulators, Heaters, Heaters and Purifiers, etc., Feed Water)

Feed Water Controllers
(See Regulators, Feed Water)

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Filters, Gravity
* Permutit Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Graver Corp'n
* Permutit Co.

Filters, Water
Elliott Co.
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fire Tube Boilers
(See Boilers, Return and Vertical Tubular)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Lunkenheimer Co.

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.

Types. Internally and Externally Fired Boilers. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 27–32, 11 figs. Describes the various types of vertical boilers, and the uniflow boiler. Specifications for vertical boilers of 100 and 125 lb. pressure, vertical boiler with submerged tubes, and portable boiler; tables giving dimensions of Manning and firebox heating boilers, horsepower rating of uniflow boilers, and general proportions of continental boiler ranging from 50 to 300 hp.

Water-Tube. See BOILERS, WATER-TUBE.

BOILERS, WATER-TUBE

Large-Capacity. Large Capacity Water-Tube Boilers. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 1–4, 11 figs. Describes installations of various plants.

Types. Water-Tube Boilers. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 41–59, 41 figs. Describes Babcock & Wilcox, Bigelow-Hornsby, Bonar, Casey-Hedges, Edge Moor, Erie City, Franklin, Heine, Keeler, Ladd, Morrison, O'Brien, Geary, Root, Rust, Stirling, Union, Voght, Walsh & Weidnet, Worthington, Page, Murray, Springfield, Bass, Davis, and Wickes water-tube boilers, and Hawkes and Koschell combination fire- and water-tube boilers.

BONUS SYSTEMS

Foremen. Some details in the Application of a Bonus on Operation and Maintenance, A. A. Frank. Indus. Engr., vol. 81, no. 1, Jan. 1923, pp. 4–10 and 67, 12 figs. Plan whereby foremen are rewarded according to economies they can show in maintenance and power costs.

BRAKES

Continuous. Continuous Brakes on Freight Trains. Ry. Gaz., vol. 38, no. 3, Jan. 19, 1923, pp. 91–92. Investigation of extent to which, if at all, application of continuous brakes to all classes of freight trains is warranted in England.

Freight Trains. Brakes for Freight Trains (Le freinage des trains de marchandises). Nature, no. 2544, Jan. 6, 1923, pp. 1–4, 3 figs. Vacuum and air brakes; French and American continuous brakes.

Westinghouse. The Westinghouse Pressure Brake. Autocar, vol. 49, no. 1418, Dec. 22, 1922, pp. 1281–1282, 4 figs. Device which applies brake shoes by means of gas pressure and ensures perfect compensation; made primarily for lorries and such heavy vehicles, but applicable to touring car and particularly where four-wheel brakes are standard.

BRONZES

Casting. Casting Bronze in Green-Sand Moulds, M. J. Leonard. Foundry Trade Jl., vol. 27, no. 335, Jan. 18, 1923, p. 47. Technical difficulties of method; bronzes and sands used. Translated from Bul. L'Assn. Technique de Fonderie de Liége.

BUSES

Operation Methods. New York, London, Paris and Berlin Bus Conditions Compared. Bus Transportation, vol. 2, no. 1, Jan. 1923, pp. 23–25, 2 figs. Extended review of reports to New York Transit Commission, based on recent inspections; comparison of extent of bus service and methods of operation.

C

CAR WHEELS

Worn, Salvage of. The Salvage of Worn Steel Car Wheels, W. J. Merten. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 84–88, 12 figs. Influence of complex internal wheel stresses and strains on building up worn flanges and treads by arc welding; preheating essential before welding.

CARS, COAL

Gondola. A Discussion of the Methods Used in Designing the C. M. & St. P. Gondola, Wendel J. Meyer. Ry. Mech. Engr., vol. 97, no. 2, Feb. 1923, pp. 109–111, 6 figs. Comments on analyses used in description of method employed in designing cars, published in same journal, Nov. 1922.

CARS, FREIGHT

Automobile. Chicago, Milwaukee & St. Paul Automobile Cars. Ry. Mech. Engr., vol. 97, no. 2, Feb. 1923, pp. 97–105, 14 figs. Calculations from specifications of stresses in truck members, body frame and underframe.

Ore-Carrying. Large Capacity Ore Car. Ry. Jl., vol. 29, no. 1, Jan. 1923, pp. 18–19, 8 figs. Describes Commonwealth cars of Duluth Missabe & Northern Ry., having special features intended to insure economy in operation as well as affording large tonnage per car.

CARS, PASSENGER

Articulated. New Articulated Main Line Carriage, Great Indian Peninsula Railway. Ry Gaz., vol. 38, no. 3, Jan. 19, 1923, pp. 84–85, 2 figs. Introduced to provide augmented first-class accommodation on mail trains, without attaching additional separate vehicle.

CASE-HARDENING

Boxes for. Efficient Case Hardening Boxes, L. C. Dunn. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 53–54, 4 figs. Considerations in design of efficient boxes with special reference to type of furnace and work to be treated; comparison of plain carbon and alloy boxes.

CAST IRON

Solidification. Volume Changes of Cast Iron on Solidification, Oliver Smalley. Foundry Trade Jl., vol. 27, no. 337, Feb. 1, 1923, pp. 89–99, 60 figs. Series of experiments conducted on volume change of various cast irons on solidification as related to piping or drawing. Casting without risers or feeding.

Special Elements, Effect of. The Effect of Special Elements on Cast-Iron—II, Oliver Smalley. Foundry Trade Jl., vol. 27, no. 333, Jan. 4, 1923, pp. 3–6, 7 figs. Effect of molybdenum on cast iron; physical tests; chemical analysis and microscopical examination; effect of chrome.

CHAINS

Cast. Producing Detachable Cast Chain, Herbert R. Simonds. Iron Trade Rev., vol. 72, no. 6, Feb. 8, 1923, pp. 446–449, 5 figs. Introduction of assembling machine for locking together malleable iron links makes possible output three times greater than with hand method; casting, finishing, annealing and assembly operations.

CLUTCHES

Friction, Design. Improvements in Design of Friction Clutches, V. R. Bruce. Can. Machy., vol. 29, no. 3, Jan. 18, 1923, pp. 18 and 32, 2 figs. Eliminating power loss; characteristic of various types; advantages of plate design; effect of centrifugal action.

COAL

Preparation. Selective Preparation of Boiler Fuel, Noel Cunningham. Combustion, vol. 8, no. 2, Feb. 1922, pp. 98–101, 2 figs. Brief description of methods of preparing better coal, with view to aiding consumer to greater economies in its uses.

COAL HANDLING

Power Plants. Coal Handling and Electricity Supply, George F. Zimmer. Elecn. vol. 39, no. 2328, Dec. 29, 1922, pp. 742–747, 9 figs. Describes modern installation at Blackburn electricity station.

COMBUSTION

Heat of Gases. Internal Combustion and the Specific Heat of Gases. Mar. Engr. & Naval Architect, vol. 46, no. 544, Jan. 1923, pp. 17–18, 1 fig. Lack of theoretical knowledge on subject compared with advance of practice; necessity for further information.

CONNECTING RODS

Milling. Milling Automobile Connecting-rods, Charles Littelmann. Machy. (N. Y.), vol. 29, no. 6, Feb. 1923, pp. 433–434, 4 figs. Handling work on two-story fixture; power requirements; arrangement when both bosses are of equal length.

CONVEYORS

Belt. Belt Conveyors in Bulk Storage Plant at Portland, Ore., W. A. Scott. Belting, vol. 22, no. 1, Jan. 1923, pp. 15–17, 4 figs. Describes system used in plant on Willamette River for transferring materials from cars to storage and thence to ships as needed; equipped especially for handling in bulk phosphate, rock, coal, ores, sulphur and non-metallic minerals.

COOLING TOWERS

Action of. Analysis of Cooling Tower Performance, J. W. Gavett, Jr. Power Plant Eng., vol. 27, no. 4, Feb. 15, 1923, pp. 217–221, 1 fig. Fundamental principles underlying action of cooling tower; use of psychrometric chart demonstrated.

Design. The Design of Cooling Towers, C. S. Robinson. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 99–102, 1 fig. Author establishes general principle applicable to cooling-tower design and derives equations for use of designer; presents experimental data to substantiate validity of formulas and shows by actual experiment how they are applicable to design of counter-current cooling tower. (Abridged.)

CORROSION

Anti-Fouling Compositions. Anti-Corrosive and Anti-Fouling Compositions, P. E. Bowles. Soc. Chem. Industry—Jl., vol. 41, no. 22, Nov. 30, 1922, pp. 492R–495R, 3 figs. Discusses conditions to be sought in making anticorrosive paint, most satisfactory products being certain pitches and asphalt solutions.

COST ACCOUNTING

By-Product Coke Plant. Accounting and Costing for By-Product Coking Plants, M. Mackenzie. Iron & Coal Trades Rev., vol. 106, nos. 2862, 2863 and 2864, Jan. 5, 12 and 19, 1923, pp. 4–5, 46–47 and 78–79, 11 figs. Author describes system from theoretical aspect; actual method of operation; and preparation of monthly statement and its reconciliation with financial books.

Clay Products Plants. An Uncostly Cost Accounting System, W. A. Barron. Brick & Clay Rec., vol. 62, no. 1, Jan. 9, 1923, pp. 30–35 and 64–65, 4 figs. System of Barron Brick Co., using only four forms or sheets, which has been proven thoroughly successful in actual operation; uses symbols to designate accounts.

Drop-Forge Industry. The Budget in the Drop Forge Industry, C. Oliver Wellington. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 38–41. How to prepare budget and use it in controlling costs; how to make proper provisions for desired profits and for unearned burden.

Factory. Factory Cost from Rough Castings to Product, A. Lunenberg. Can. Machy. vol. 29, nos. 1, 2 and 3, Jan. 4, 11 and 18, 1923, pp. 24–25, 19–20 and 32, and 23 and 25, 10 figs. Jan 4: Indirect expense; overhead or burden; distribution among departments; monthly method of handling; figuring depreciation. Jan. 11: Expense of replacing defective castings; repairs to patterns; handling supplies. Jan. 18: Checking up material in different departments; inventory of completed and semi-finished work.

Nomogram for Net Calculation. The Nomogram in Net-Cost Calculation (Das Nomogramm in der Slebstkostenberechnung), A. Winkel. Werkstattstechnik, vol. 17, no. 1, Jan. 1, 1923, pp. 12–14, 2 figs. Method of determining net cost of simple products or working processes.

CRANES

Gasoline-Electric Road. A Petrol-Electric Road Crane. Engineer, vol. 135, no. 3499, Jan. 19, 1923, p. 66, 2 figs. Evolved with idea of rapidly handling loads up to 2 tons in any situation where it may be possible to drive a motor lorry.

Locomotive. The 80-Ton Oerlikon Crane for Locomotive Repair Shops (Le gru da 80 tonn. dell'Officina di riparazione dei locomotori delle Ferrovie Federali in Bellinzona, fornite dalla Maschinenfabrik Oerlikon), Druey. Rivista Tecnica della Svizzera Italiana, vol. 11, no. 12, Dec. 1922, pp. 136–138, 2 figs. Design and operation of Ward-Leonard control cranes.

Traveling. Traveling Crane Has Turntable to Swing Locomotives. Eng. News-Rec., vol. 90, no. 6, Feb. 8, 1923, pp. 250–251, 2 figs. Engines transferred from longitudinal shop track to transverse track by rotating hoist on trolley of crane.

Wrecking. A Powerful Steam Breakdown Crane, Jamaica Government Railways. Ry. Gaz., vol. 38, no. 4, Jan. 26, 1923, pp. 116–117, 3 figs. 40-ton crane built by Cowans Sheldon & Co., Carlisle.

CRANKSHAFTS

Torsion. Torsion of Crankshafts, S. Timoshenko. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 96–98, 4 figs. Considers case of crankshaft with single throw and establishes mathematical relations for such case; investigates three conditions of such crankshaft: (1) no constraint, corresponding to ample clearance in bearings; (2) complete constraint, corresponding to no clearance; and (3) partial constraint, corresponding to ample clearance in halves of bearings nearest web and no clearance in other halves.

Webs, Machining. The Machining of Crank Webs (Die Bearbeitung der Kurbelwellenarme), Heinrich Steiner. Motorwagen, vol. 25, no. 31, Nov. 10, 1922, pp. 600–603, 6 figs. Describes machining operations and a special machine for (Moll system) machining webs for automobile-, airplane- and Diesel-engine crankshafts.

CUPOLAS

Problems of. The Foundry Cupola, Robert Buchanan. Foundry Trade Jl., vol. 27, nos. 333, 334 and 335, Jan. 4, 11, and 18, 1923, pp. 9–13, 27–28 and 41–42, 1 fig. Historical review; tuyere considerations; how to deal with poor coke; comparison of types of cupolas; management; cupola linings; charging; melting; cupola slag.

Steel-Melting. Throws Light on Steel Melting, G. Muntz. Foundry, vol. 51, no. 2, Jan. 15, 1923, pp. 77–79, 1 fig. Experiments made under stress of war necessity result in procedure for melting steel in cupola; priming charge of pig iron deemed imperative to maintain fluidity.

Tuyeres. Foundry Cupola Tuyeres, H. H. Shepherd. Metal Industry (Lond.), vol. 22, no. 1, Jan. 5, 1923, pp. 11–12. Considerations concerning tuyeres, that should be taken into account when buying, designing, or "running" melting section of iron foundry; arguments against use of spiral or double-row tuyere arrangement.

CYLINDERS

Molding Castings. Molding Large Card Cylinders, H. R. Simonds. Foundry, vol. 51, no. 3, Feb. 1, 1923, pp. 87–92, 14 figs. Ingenious flask and pattern rigging in connection with jolt machines and sand-handling equipment applied to production of large cylindrical castings used in textile industry.

D

DIES

Blanking, Trimming and Forming. Blanking, Forming and Trimming Dies, C. A. Handschin. West. Machy. World, vol. 14, no. 1, Jan. 1923, pp. 12–13 and 15, 2 figs. Operations in manufacture of contactor cover used on pump for Colmar kerosene burner.

Motor Laminations. Punching Rotor and Stator Laminations, Charles O. Herb. Machy. (N. Y.), vol. 29, no. 6, Feb. 1923, pp. 436–438, 7 figs. Describes three piercing and blanking dies used in sequence in manufacture of laminations for small electric motors.

Steel for Die Blocks. Composition and Manufacture of Die Block Steel, Chas. McKnight. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 44–46. Discusses merits of various steels used for die blocks; comparison of straight carbon and alloy steels.

DIESEL ENGINES

Clutches. Diesel-Engine Clutch Used in the German Submarine "U–117," W. H. Nicholson. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 113–115, 8 figs. Information obtained at time of dismantling of ex-German submarines in United States. The U–117's clutch is described in detail and other types of German Diesel-engine clutches are covered generally.

Compressorless. New Fuel Valves for Compressorless Diesel Engines (Neue Brennstoff-Ventile für kompressorlose Dieselmaschinen), Roick. Motor u. Auto, vol. 19, nos. 23–24, Dec. 20, 1922, pp. 285–286,

Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* United States Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Pittsburgh Valve Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Steel
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Flanges
* American Spiral Pipe Works
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flooring, Rubber
United States Rubber Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co

Fly Wheels
* Medart Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Furnace & Burner Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Foundry Equipment
Northern Engineering Works
Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnace **Linings**
(See Linings, Furnace)

Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Whiting Corp'n

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Kenworthy, Chas. F. (Inc.)

Furnaces, Forging
Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Whiting Corp'n

Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co.
* Murphy Iron Works
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
* Johns-Manville (Inc.)

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Glasses
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Gages, Differential Pressure
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co

Gages, Draft
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Liquid Level
* Bristol Co.
* Lunkenheimer Co.
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
* Norma Co. of America

Gages, Pressure
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gages, Water Level
* Bristol Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gas Analysis Apparatus
* Precision Instrument Co. (Inc.)

Gas Burners, Compressors, Engines, Exhausters, Producers, etc.
(See Burners, Compressors, Engines, Exhausters, Producers, etc., Gas)

Gas Collectors
* Precision Instrument Co. (Inc.)

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Gasoline
Texas Co.

Gates, Blast
Link-Belt Co.

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.
* Pittsburgh Valve Foundry & Const. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.

Gears, Cut
Brown, A. & F. Co.
* Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co
Hindley Gear Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Poole Engrg. & Mch. Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Machine Moulded
Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.

Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co
* Kerr Turbine Co.
Link Belt Co.
Poole Engrg. & Mch. Co.

Gears, Worm
* Chain Belt Co.
* Fawcus Machine Co.
Link-Belt Co.
* Foote Bros. Gear & Machine Co
* Gifford-Wood Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks
* General Electric Co.
* Ridgway Dynamo & Engine Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Davis, G. M. Regulator Co
* Kieley & Mueller (Inc.)

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co.

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave Brooks Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* McClave Brooks Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grates, Kiln
* McClave Brooks Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave Brooks Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
Dixon, Joseph Crucible Co.
* Royersford Foundry & Machine Co.
Texas Co.
Vacuum Oil Co.

Grinding Machinery
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Foundry & Machine Co.

Guards (Electric Lamps)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Bliss, E. W. Co.
* Franklin Machine Co.
Long & Allstatter Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hangers, Shaft
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Foundry & Machine Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball and Roller Bearing)
* Jones, W. A. Fdry. & Mach. Co.
* S K F Industries (Inc.)

Hangers, Shaft (Roller Bearing)
* Hyatt Roller Bearing Co.

Hard Rubber Products
United States Rubber Co.

2 figs. Discusses recent German and British patents.

The Deutz Horizontal Compressorless Diesel Engine (Der Deutzer liegende kompressorlose Dieselmotor), Kurt Schmidt. Zeit. des Vereines deutscher Ingenieure, vol. 66, no. 51–52, Dec. 23, 1922, pp. 1125–1129. 24 figs. Characteristics of best-known processes for mixture formation in Diesel engines; the Deutz extended-piston engine; investigation of effect of piston extension on fuel consumption; behavior with different fuels; structural details.

Design. Diesel Machinery and Its Auxiliaries. Mar. Engr. & Naval Architect, vol. 46, no. 544, Jan. 1923, pp. 5–7 and 11. Single or twin-screw considerations; alternative methods of driving auxiliary machinery; lubricating system; utilization of waste heat in exhaust gases.

Marine. Diesel Engines for Two New Holt Liners. Shipbldg. & Shipg. Rec., vol. 21, no. 5, Feb. 1, 1923, pp. 131–132, 5 figs. partly on pp. 133–134. Describes Burmeister & Wain twin-screw, 8-cylinder, 4-cycle, single-acting engines of 6000 i.hp. at 115 r.p.m., and Burmeister & Wain single-screw, 8-cylinder, 4-cycle, single-acting engines of 3000 i.hp. at 85 r.p.m., for cargo liners of Ocean Steamship Co.

Marine Oil-Engine Installation and Auxiliaries, P. Belyavin. North-East Coast Instn. Engrs. & Shipbldrs., advance paper, no. 2657R, for meeting Feb. 2, 1923, 14 pp., 7 figs. Suggestions, based on author's experience with marine-Diesel-engine installations since 1908, for cheapest and most economical installation without making any sacrifices in reliability.

Manufacture. Operations in the Manufacture of Diesel Engines. Machy. (Lond.), vol. 21, no. 538, Jan. 18, 1923, pp. 481–489, 23 figs. Review of methods employed by Mirrlees, Bickerton & Day, Ltd., Stockport.

Sulzer. The Sulzer two-cycle marine engine, L. J. Le Mesurier. Ingenieur, vol. 38, no. 1, Jan. 6, 1923, pp. 1–12 and (discussion) 12–13, 26 figs. Principle of Sulzer two-cycle engine; scavenging pumps; comparison between two-cycle and four-cycle; applications of both stationary and marine Sulzer engines; shop trials of 3400-h.hp. Sulzer twin-screw two-cycle engines. (In English).

DRILLING MACHINES

Headstock. Headstock Drilling Machines (Spindelstockbohrmaschine), F. Uber. Werkstatt-technik, vol. 16, no. 22, Nov. 15, 1922, pp. 685–688, 22 figs. Special drilling operation for simultaneous production of row of parallel holes in headstocks and gear cases of machine tools.

Types. Two New Drilling Machines. Engineer, vol. 135, no. 3501, Feb. 2, 1923, pp. 128–129, 3 figs. Describes portable horizontal and heavy-duty vertical drilling machines constructed by William Asquith, Halifax.

DRY KILNS

Cutler. A New Drykiln Installation, Wood-Worker, vol. 41, no. 11, Jan. 1923, pp. 56–57, 2 figs. Describes three-compartment Cutler dry kiln.

Lumber. Lumber Dry Kilns, Thomas D. Perry. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 110–112 and 120, 5 figs. Describes blower, condenser and ventilated kilns and discusses possibilities of each, with particular reference to ventilated kiln, of which there are several classes. Data showing relation between relative and absolute humidity during drying period.

DYNAMOMETERS

Hardness Testing. Elastic Column Dynamometer for Hardness Testing, Herman A. Holz. Chem. & Met. Eng., vol. 28, no. 6, Feb. 7, 1923, pp. 269–270, 3 figs. Dynamometer, designed by A. J. Amsler, imposes load by train of gears and screws.

E

EDUCATION, ENGINEERING

Training of Students. Training of Engineering Students, E. P. Mathewson. Min. & Metallurgy, vol. 4, no. 193, Jan. 1923, pp. 9–10. In author's belief too great specialization is a mistake; recent graduates seem to be weak in accounting, command of English, and training in writing of reports; personal contact should be encouraged.

ELECTRIC DRIVE

Handling Materials, Application to. The Driving of Handling Machinery, H. Blyth. Elecn., vol. 89, no. 2328, Dec. 29, 1922, pp. 734–737, 9 figs. Applications of electric drive to mechanical handling of materials.

ELECTRIC FURNACES

Ajax-Wyatt. Ajax-Wyatt Electric Brass Furnace, W. S. Gifford. Metal Industry (Lond.), vol. 22, no. 2, Jan. 12, 1923, pp. 30–31 and 34, 4 figs. Notes on cost of electric power, labor, repairs and relining, metal losses and overhead charges, all of which, with exception of first, are very low.

Combustion vs. Electrically Heated Industrial Furnaces, W. Trinks. Forging & Heat Treating, vol. 8, no. 12, Dec. 1922, pp. 538–542, 14 figs. Efficiency of electrically heated and combustion-type furnaces compared; design of heating elements and supports; advantages and disadvanatges of various types of construction.

Developments. Recent Electric Furnace Developments, Edward T. Moore. Blast Furnace & Steel Plant, vol. 11, no. 2, Feb. 1923, pp. 153–158, 6 figs. Rapid recovery from stagnation experienced during previous year; gray-iron foundries slow to realize advantages of electric melting of low-phosphorus irons.

Greaves-Etchell. The Greaves-Etchell Electric Furnace for Steel Making, Alfred Stansfield. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 64–68, 6 figs. Furnace has two electrodes, entering through roof, and specially designed three-phase electrical supply connected to two top electrodes and electrode hearth. Bibliography. From advance sheets of author's new book, The Electric Furnace for Iron and Steel, publishers, McGraw-Hill Book Co.

Kryptol. Electric Furnaces for Small Plants and Laboratories (Elektrische Schmelzöfen fur das Kleingewerbe und fur den Versuchsraum), H. Barkow. Gewerbefleiss, vol. 101, no. 12, Dec. 1922, pp. 340–344, 3 figs. Describes construction and operation of electric furnaces of Kryptol type, with capacity of about 2 kg.

Metal Melting. Electric Furnace of the Brown-Boveri Type (Elektrischer Metallschmelzofen Bauart Brown Boveri). Schweizerische Bauzeitung, vol. 81, no. 3, Jan. 20, 1923, pp. 30–31, 1 fig. Combination of arc and resistance furnaces, using three-phase current; for metallurgical purposes.

Pig Iron. The Production of Foundry Pig Iron in the Electric Furnace (Ueber die Herstellung von Giessereiroheisen im elektrischen Ofen), Leif Lyche. Stahl u. Eisen, vol. 43, no. 4, Jan. 25, 1923, pp. 110–116, 2 figs. Modern electric pig-iron furnaces of the Arendal Smelteverk A.-G. with two shafts; composition of charge; operating difficulties; smelting results compared with those from other furnaces; heat balance of furnace.

Steel. West Favors Electrical Methods, Larry J. Barton. Iron Trade Rev., vol. 72, no. 6, Feb. 8, 1923, pp. 435–437. List of electric-furnace installations on Pacific coast; costs of labor and materials.

ELECTRIC LOCOMOTIVES

Operation. Some Records of Electric Locomotives and Motor Cars in American Railway Service, Homer K. Smith. Tramway & Ry. World, vol. 52, no. 29, Dec. 14, 1922, pp. 302, 10 figs. Operating records of number of railways that have adopted electric traction, including Long Island, N. Y., N. H. & Hartford, Pennsylvania, Norfolk & Western, and others.

Single-Phase. Single-Phase Electric Locomotive with Individual Axle Drive. Ry. Engr., vol. 44, no. 516, Jan. 1923, pp. 18–23, 11 figs. Express passenger locomotive designed and built by Brown, Boveri & Co., Baden Switzerland, for Swiss Federal Rys.; advantages claimed for individual axle drive.

Single phase 4-6-2 express locomotives with independent driving axles of the "Brown Boveri" type. Int. Ry. Congress Assn.—Bul., vol. 4, no. 12, Dec. 1922, pp. 1477–1483, 5 figs. Details of design of locomotive in service on Swiss Federal Rys.; results obtained in service. From Schweizerische Bauzeitung.

South African Railways. Electric Locomotives for South African Railways. Ry. Engr., vol. 44, no. 516, Jan. 1923, pp. 12 and 23, 1 fig. Designed to haul passenger and freight trains, arranged so that they can be worked alone or with other locomotives in multiple unit controlled by one driver; 0-4-4-0 type; four 300-hp. motors; tractive effort, continuous, 16,400 lb.

The Electrification of the South African Railways—The Electric Locomotives. So. African Eng., vol. 33, no. 12, Dec. 1922, pp. 239–240, 2 figs. Describes locomotives built by Metropolitan-Vickers Elec. Co., Ltd., to be used on line being electrified, in Natal, between Pietermaritzburg and Glencoe Junction; designed to haul passenger and freight trains, and arranged so they can be worked alone or with other locomotives in multiple unit controlled by one driver.

ELECTRIC WELDING, ARC

Development. Arc Welding, O. H. Eschholz. Am. Welding Soc.—Jl., vol. 2, no. 1, Jan. 1923, pp. 33–40, 6 figs. Discussion of incomplete development activities; 100-per cent fusion welds; mechanical working; arc phenomena—penetration; high-speed welding.

ELEVATORS

Electric, Sheave for. Hemp-Fiber-Packed Sheave Used on Traction Elevator Machine. Power, vol. 57, no. 6, Feb. 6, 1923, pp. 216–217, 8 figs. New type of single-wrap traction elevator machine on which traction-sheave face is made of short pieces of hemp fiber set radially and known as fiber-packed sheave.

EMPLOYEES' REPRESENTATION

Copper Queen Mines. Employees' Representation at the Copper Queen Mines, Cleveland E. Dodge. Min. & Metallurgy, vol. 4, no. 193, Jan. 1923, pp. 17–18. Plan modeled after constitution of United States.

Pennsylvania R. R. Employee Representation on the Pennsylvania, E. T. Whiter. N. Y. Railroad Club—Proc., vol. 33, no. 1, Dec. 1922, pp. 6855–6869. Includes article by Leo I. Kennedy on Pennsylvania's plan from employee's viewpoint.

ENGINEERING LITERATURE

Classification and Indexing. Utilization of the Contents of Engineering Journals (Verwertung des Inhalts technischer Zeitschriften), Fritz Helm. Werkstattstechnik, vol. 16, no. 22, Nov. 15, 1922, pp. 688–690, 2 figs. Suggestions for better utilization and indexing of technical-journal literature; assignment and indexing of separate articles; system of classification.

F

FANS, CENTRIFUGAL

Tests. Tests of Centrifugal Ventilators, with Special Reference to Initial Water-Gauge, Henry C. Harris. Min. Inst. Scotland—Trans., vol. 43, part 4, Dec. 9, 1922, pp. 70–78, 2 figs. Details of practical test on Capell and Sirocco fans; suggested method for determination of initial water gage of fan.

FLIGHT

Wind-Power. Sailing the Air With Wind Power, D. W. Starrett. Aerial Age, vol. 16, no. 2, Feb. 1923, p. 68. Refers to apparatus constructed by writer in 1910 which proved principle of bird wingless flight. Points out that motorless airplane, properly constructed, can carry freight and passengers in any direction, with power equal to that of wind.

FLOW OF GASES

Orifices. Flow of Gases Through Orifices, George B. Shawn. Am. Gas Jl., vol. 118, no. 2, Jan. 13, 1923, pp. 23–25, 1 fig. What has been developed by experimental work. Discussion and comparison of hydraulic and adiabatic formulas.

FLOW OF WATER

Vortex Motion. Absolute Dimensions of Karman Vortex Motion, Werner Heisenberg. Nat. Advisory Committee for Aeronautics, Tech. Notes, no. 126, Jan. 1923, 10 pp., 2 figs. Study, based on investigation by Karman of resistance of plate moving perpendicularly to its surface through water. Translated from Physikalische Zeit., Sept. 15, 1923. Includes remarks on article by L. Prandtl.

FLUE-GAS ANALYSIS

Apparatus. New Method of Determining Heat Losses Due to Incomplete Combustion in Furnaces, O. I. Housey. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 117–122, 3 figs. Results of experiments carried out by K. E. Nielsen in laboratories of Danish Soc. for Control of Fuel & Combustion, show that method described in this and previous article is quick, reliable and exact means of determining heat losses in flue gases due to incomplete combustion.

Hyperbolas of Components. The Hyperbolas of Flue-Gas Components (Zu den Hyperbeln der Rauchgas-Bestandteile), Georg Szende. Feuerungstechnik, vol. 11, no. 7, Jan. 1, 1923, pp. 73–76, 1 fig. Relation between air coefficient on the one hand, and percentage flue-gas components of a fuel of reduced molecular formula C_mH_m on other hand, is shown in hyperbola groups; as parameter of every hyperbola group, the CO content is chosen.

Testing Apparatus. The Unograph, Karl Müller. Eng. Progress, vol. 4, no. 2, Feb. 1923, pp. 27–28, 1 fig. Method of operation and design of flue-gas tester.

FLYWHEELS

Explosions. Flywheel Explosions and Their Prevention, E. B. Tolsted. Can. Machy., vol. 29, no. 4, Jan. 25, 1923, pp. 15–16. Safety factor in pulley and flywheel work; point of actual bursting; reason for rupture; recording flywheel accidents; types of failure.

FORGE SHOPS

Layout. Description of a Well Balanced Forge Plant, D. L. Mathias. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 18–25, 15 figs. Outline of Titusville (Pa.) Forge Co.'s plant, equipped to forge and machine great variety of shapes.

FORGING

Developments 1922. Items from the Literature of Forging and Heat Treating, Stephen L. Goodale. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 14–16. Review of important developments of 1922, with special emphasis given to cost accounting, fuel economy and coöperative research.

Forge Blower. New Forge Blower, D. M. McLean. Iron & Steel of Canada, vol. 5, no. 12, Dec. 1922, pp. 225–226, 4 figs. New device for blowing forge fires, etc., introduced in Canada by Can. Ingersoll-Rand Co. Gives new meaning to term "free air."

FOUNDRIES

Ford Motor Co. Ford Principles and Practice at River Rouge, John H. Van Deventer. Indus. Management (N. Y.), vol. 65, no. 2, Feb. 1923, pp. 67–76, 28 figs. Operation of world's largest foundry.

Schneider & Co., France. The "Henri-Paul" Foundry of Messrs. Schneider et Cie. Foundry Trade Jl., vol. 27, no. 335, Jan. 18, 1923, pp. 48–57, 14 figs. Organization and equipment of modern foundry for production of heavy castings. Translated from Science et Industrie.

Steel. A Western Steel Casting Foundry, C. A. Handschin. West. Machy. World, vol. 14, no. 1, Jan. 1923, pp. 5–7, 9 figs. Equipment and methods used in manufacture of steel casting on Pacific Coast.

Builds New West Coast Foundry, Don Partridge. Iron Trade Rev., vol. 72, no. 4, Jan. 25, 1923, pp. 300–302, 8 figs. Describes foundry of Llewellyn Iron Works in Los Angeles; equipment includes three cupolas.

FREIGHT HANDLING

Demountable Truck Bodies. British Demountable Bodies or Flats Save 30% Time. Commercial Vehicle, vol. 27, no. 11, Jan. 1, 1923, pp. 7–8, 4 figs. Details of system used on British railways, for rapid handling of loads; demountable motor-truck body, a platform mounted on set of 8 or more very

Hardening
* American Metal Treatment Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

Heaters, Water Supply
Herbert Boiler Co.

Heaters, Water Supply (Garbage Burner)
Herbert Boiler Co.

Heaters & Mixers, Water, Instantaneous
Manufacturing Equipment & Engrg. Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.
* Erie City Iron Works
* H.S.B.W.-Cochrane Corp'n
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water Metering
* H.S.B.W.-Cochrane Corp'n

Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
Clarage Fan Co.

Heating Specialties
* Fulton Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.

Hoisting Outfits
Novo Engine Co.

Hoists, Air
* Ingersoll-Rand Co.
Northern Engineering Works
* Shepard Electric Crane & Hoist Co.
Whiting Corp'n

Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n

Hoists, Electric
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Electric Crane & Hoist Co.

Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.
Novo Engine Co.

Hoists, Head Gate
Smith, S. Morgan Co

Hoists, Locomotive & Coach
Whiting Corp'n

Hoists, Mine
Lidgerwood Mfg. Co.
Novo Engine Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Hoists, Steam
(See Engines, Hoisting)

Holders, Nipple
Curtis & Curtis Co.

Hose, Acid
United States Rubber Co.

Hose, Air and Gas
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Fire
United States Rubber Co.

Hose, Gas
United States Rubber Co.

Hose, Gasoline
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Metallic
* Johns-Manville (Inc.)

Hose, Oil
United States Rubber Co.

Hose, Steam
United States Rubber Co.

Hose, Suction
United States Rubber Co.

Hose, Water
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n

Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Worthington Pump & Machinery Corp'n

Hydraulic Machinery
* Allis-Chalmers Mfg. Co.
Hydraulic Press Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Rams, Presses, Turbines, etc.
(See Rams, Presses, Turbines, etc., Hydraulic)

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
Taylor Instrument Cos.

Hygrometers
Taylor Instrument Cos.

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Gifford-Wood Co.

Idlers (Lenix)
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Indicators, CO
* Uehling Instrument Co.

Indicators, CO_2
Bacharach Industrial Instrument Co.
* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.

Indicators, Engine
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Indicators, SO_2
* Uehling Instrument Co.

Indicators, Speed
* Schaeffer & Budenberg Mfg. Co and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Injectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Inserts, Steel
Midwest Steel & Supply Co.

Instruments, Electrical Measuring
* General Electric Co.
Taylor Instrument Cos.
Weston Electrical Instrument Co.

Instruments, Recording
* Ashton Valve Co.
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* General Electric Co.
* Precision Instrument Co
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Instruments, Scientific
Taylor Instrument Cos.

Instruments, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Insulating Materials (Electric)
* General Electric Co.
* Johns-Manville (Inc.)

Insulating Materials (Heat and Cold)
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Foundry & Const. Co.
United States Rubber Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Pipe, Flanged
* Pittsburgh Valve, Foundry & Const. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.
* Lunkenheimer Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.
* Titusville Iron Works Co.

Keys, Machine
Smith & Serrell
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Ladles
Northern Engineering Works
Whiting Corp'n.

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
* Johns-Manville (Inc.)

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Levers, Flexible (Wire)
* Gwilliam Co.

Lightning Arresters
* General Electric Co.

Linings, Brake
* Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Furnace & Burner Corp'n
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
McLeod & Henry Co.
* Quigley Furnace Specialties Co

Linings, Stack
* Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n

Loaders, Portable
Link-Belt Co.

Loaders, Wagon
* Gifford-Wood Co
Link-Belt Co.

Lockers, Metal
Manufacturing Equipment & Engrg. Co.

Locomotives, Electric
* General Electric Co.

Locomotives, Storage Battery
* General Electric Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Machine Work
Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Lammert & Mann Co.
Link-Belt Co.
Purvis Machine Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.
* Simplex Valve & Meter Co.

Mechanical Draft Apparatus
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Mechanical Stokers
(See Stokers)

Metal Cutting Machines
(See Cutting-off Machines, Metal)

Metal Equipment
Manufacturing Equipment & Engrg. Co.

Metal Reclaiming Mills
(See Mills, Metal Reclaiming)

Metal Treating
* American Metal Treatment Co.

Metals, Bearing
* General Electric Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* Precision Instrument Co. (Inc.)
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Simplex Valve & Meter Co.

small wheels, is pushed on to truck which is fitted with pair of steel rails mounted direct on bolsters; 5 minutes to load, 12 minutes to unload.

FUELS

Heat Treating and Forging. Economic Factors Affecting Fuel Selection, J. A. Brown. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 73–78, 3 figs. Technology of production and economics of energy utilization as applied to forging and heat-treating furnaces; essential characteristics of fuels.

Meta Solidified Alcohol. White Coal or Meta (Le charbon blanc ou meta), R. Villers. Nature, no. 2540, Dec. 9, 1922, pp. 373–375. Solidified alcohol; physical and chemical properties of metaldehyde; production of meta (abbreviated from its scientific name, metaldehyde); combustion of compressed metaldehyde.

Slag and Ashes. New Patent Process to Recover Fuel from Slag and Ashes with the Aid of Magnets, F. A. Brackmann. Ry. & Locomotive Eng., vol. 36, no. 2, Feb. 1923, pp. 41–42, 2 figs. Describes system of dry magnetic separation and patented plants put on market by German Krupp-Gruson Works, making use of fact that iron pyrites in coal change into ferric oxide during combustion.

Waste, Utilization of. Economic Combustion of Waste Fuels, David Moffat Myers. U. S. Bur. of Mines Tech. Paper, no. 279, 1922, 51 pp., 20 figs. Classification of waste fuels; combustion; utilization of semi-combustible substances as fuel; tanbark and wood chips; principles involved in increasing efficiency of combustion; efficient burning of low-grade waste fuels. Bibliography.

FURNACES

Arch Designing. Furnace Arch Designing. Practical Engr., vol. 66, no. 1868, Dec. 14, 1922, pp. 372–374, 4 figs. Comments on engineering practice in finding maximum efficiency.

FURNACES, ANNEALING

Flameless Firing. Controlled Flameless Firing, Without an Explosive Mixture. Gas J., vol. 160, no. 3110, Dec. 20, 1922, pp. 733–734, 1 fig. Results of applying system of firing, known as "captive fire," developed seven years ago to insure constant mixture of air and gaseous fuel.

FURNACES, HOT-AIR

Rating. Significance of Air Temperature at Registers in Rating Warm-Air Furnace, A. C. Willard. Sheet Metal Worker, vol. 13, no. 25, Jan. 5, 1923, pp. 505–506, 3 figs. Results of tests showing effect of changes in air temperature.

Recirculating-Duct Design. Effect of Recirculating Duct Design on Furnace Capacity, A. C. Willard, A. P. Kratz and V. S. Day. Sheet Metal Worker, vol. 13, no. 26, Jan. 19, 1923, pp. 891–892, 2 figs. Results of tests with gravity circulation only, as conducted in furnace-research work at University of Illinois.

FURNACES, INDUSTRIAL

Brickwork. Industrial Furnace Brickwork, M. H. Mawhinney. Blast Furnace & Steel Plant, vol. 11, no. 2, Feb. 1923, pp. 145–147, 6 figs. Mechanical questions involved in use of bricks of various shapes and sizes; materials in manufacture; bonding.

Temperature Control. The Automatic Control of Temperature in Industrial Furnaces, W. Trinks and S. A. Henderson. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 68–72, 10 figs. Various types of automatic temperature controls as applied to furnaces heated by electricity, gas or oil; location of thermocouple.

G

GAGES

Standard Shafts and Holes. The Gage Requirements of Graded Standard Shafts and Holes (Der Lehrenbedarf bei der abgestuften Einheitswelle und bei der Einheitsbohrung), W. Kuhn. Werkstattstechnik, vol. 16, no. 23, Dec. 1, 1922, pp. 713–716, 12 figs. Examples are presented to show that system of standard holes requires fewer gages and is superior to standard shafts in all cases where the really smooth shaft cannot be used to advantage.

GAS PRODUCERS

Design. Gas Producers and Producer Gas, Victor Windett. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 55–60, 2 figs. Specifications covering producer design; comparative gas costs, showing influence of increased rates.

Suction-Gas. Suction Gas for Power Purposes, Ralph N. Lewis. Commonwealth Engr., vol. 10, nos. 3 and 4, Oct. 1 and Nov. 1, 1922, pp. 85–88 and 130–134, 2 figs. Some salient points concerning purchase and installation.

GASOLINE

Natural-Gas. Cost of Producing Natural-Gas Gasoline. Chem. & Met. Eng., vol. 28, no. 7, Feb. 14, 1923, pp. 297–298. Outlines scope of industry and analyzes recovery costs for various types of plants.

The Extraction of Gasoline from Natural Gas, George A. Burrell. Soc. Chem. Industry—Jl., vol. 41, nos. 23 and 24, Dec. 15 and 30, 1922, pp. 524R–527R and 549R–553R, 4 figs. Dec. 15: Extraction by compression and by absorption of oil. Dec. 30: Extraction with charcoal, and plant design.

Production, Catalytic. Catalytic Gas from Heavy Oil, Joseph F. Shadgen. Gas Age-Rec., vol. 50, no. 27, Dec. 30, 1922, pp. 897–898. Use of catalysis to increase production of gasoline and rich gases from heavy hydrocarbon oils as developed by Sabatier and Maihle. Translated from Journal des Usines à Gaz.

Quality Requirements. Group Sessions on "What Is Good Gasoline?" Am. Petroleum Inst.—Bul., vol. 3, no. 62, Dec. 30, 1922, pp. 84–128, 22 figs. Chemical Control of Gaseous Detonation with Particular Reference to the Internal Combustion Engine, Thomas Midgley, Jr., and T. A. Boyd. Answer So Far Given by Joint Research Program of U. S. Bureau of Standards and the Oil and Automotive Industries, S. W. Stratton. Results Obtained from Joint Research Tests, R. E. Carlson. Evaporation and Fire Loss Problem—Scalite, J. M. Jennings. Remarks by various authorities.

Uses. Uses of Natural Gasoline, O. P. Keeney. Oil News, vol. 11, no. 1, Jan. 5, 1923, pp. 33–35 and 50. Natural gasoline assured increasingly important place with refiners; kerosene blends proved unsatisfactory; importance of proper handling. Paper presented before Assn. Natural Gasoline Mfrs.

Volatility. Economic Motor-Fuel Volatility, R. E. Carlson. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 139–146 and (discussion) 146–150, 14 figs. Report covering investigation made by Bur. of Standards to secure data that can be used as basis for estimating effect of change in gasoline volatility on fuel consumption of cars now in service throughout United States. Describes fuels used, test cars, apparatus, tests and test methods.

GEARS

Bevel. Standardization of the Calculation of Bevel Gear Bodies (Normung der Berechnungsform von Kegelradkörpern), C. E. Berck. Werkstattstechnik, vol. 16, no. 23, Dec. 1, 1922, pp. 707–711, 19 figs. Calculation of different positions of bevel gears under any given axial angles to one another.

Grinding. Gear Grinding, R. S. Drummond. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 173–176, 3 figs. Discusses gear-grinding work on gear teeth subsequent to heat treatment, with particular attention to automobile transmission gears; salvaging of rejected gears, cost of grinding, etc.

Herringbone, Standards for. Standards for Herringbone Gears for General Commercial Use. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 145 and 146, 1 fig. Proposed by Am. Eng. Standards Committee sectional committee on standardization of gears.

Punch-Press Manufacture. Making Gears on the Punch Press, Frank Lux. Machy. (N. Y.), vol. 29, no. 6, Feb. 1923, pp. 453–456, 4 figs. Discusses three factors governing adaptability of gears to punch-press manufacture, namely, material from which gears are to be produced, size and design of work, and accuracy required.

Testing Automobile. Fixtures for Testing Automobile Gears. Machy. (Lond.), vol. 21, no. 538, Jan. 18, 1923, pp. 500–503, 8 figs. Fixtures for testing various gears which enter into well-known automobile; but with slight modifications, they could be employed for testing gears used in great variety of products besides automobiles.

GRINDING

Automobile Parts. Modern Grinding Practice, Automobile Engr., vol. 18, no. 172, Jan. 1923, pp. 11–15, 16 figs. Review of application to automobile work. Discusses grinding wheels, their grain and grade, mounting, dressing and truing; cylindrical internal, surface, and spherical grinding.

Production Estimation. Estimating Grinding Production, Robert J. Spence. Abrasive Industry, vol. 3, no. 12, Dec. 1922, pp. 369–371 and 378, 3 figs. Discusses kind of material, ratio of diameter to length, tolerance limits, degree of finish, skill required by operator, special conditions; accurate estimation of cylindrical grinding production difficult, as many variables must be considered.

GRINDING MACHINES

Centerless. Finishing Work Without Centers. Abrasive Industry, vol. 3, no. 12, Dec. 1922, pp. 363–366, 4 figs. Describes Heim, Detroit, Sanford, and Reeves centerless grinding machines and their operation; continuous in operation; handle straight and taper pieces.

Errors, Correcting. Correcting Errors in Grinding Machines, Frederick Grover. Machy. (Lond.), vol. 21, no. 538, Jan. 18, 1923, pp. 491–492, 1 fig. Investigations made with view to compensation of errors due to wear.

Internal. Internal Grinding. Abrasive Industry, vol. 4, no. 1, Jan. 1923. Contains following articles: Grinders Finish Bores Accurately, pp. 1–7, 13 figs.; Design Large Internal Grinders, pp. 9–10, 2 figs.; Portable Grinders for Many Uses, pp. 12–14, 10 figs.; Hints On Grinding Wheel Selection, E. D. Bishop, pp. 14–15; Fixtures Locate Internal Work, pp. 18–20, 8 figs.

H

HANDLING MATERIALS

Apparatus for. What It Pays to Know About Material Handling, W. T. Spivey. Factory, vol. 30, no. 1, Jan. 1923, pp. 27–29, 82, 84, 86, 88, 90 and 92, 12 figs. Use of tiering machines, portable conveyors and monorail carriers.

Equipment. Material Handling Equipment, Matthew W. Potts. Management Eng., vol. 4, no. 2, Feb. 1923, pp. 119–123, 7 figs. Why it is not more extensively used.

Lowering Goods. Lowering Goods: Quickly, Safely, and Cheaply, W. T. Spivey. Factory, vol. 29, no. 6, Dec. 1922, pp. 674–676, 728, 730, 732 and 734, 8 figs. Lowering by straight, spiral, portable, suspended-tray and roller spiral chutes.

Methods. Some Trends and Developments in Better Methods of Handling Materials, Frank E. Gooding. Indus. Engr., vol. 81, no. 1, Jan. 1923, pp. 41–45, 47 and 67, 18 figs. Mechanical lifting of light loads; light lift-and-carry equipment; cranes on trucks as shop tool.

Rock-Products Industry. Modern Conveyor Practice in the Rock Products Industries, H. D. Pratt. Rock Products, vol. 25, no. 26, Dec. 30, 1922, pp. 99–100, 15 figs. Importance of uniform feeds; types of mechanical feeders; conveyor practice at crushing plants, sand and gravel plants, and in handling lime and finely ground materials.

Steel Works. Material Handling for Steel Mills, R. W. McNeil. Blast Furnace & Steel Plant, vol. 11, no. 2, Feb. 1923, pp. 161–163, 5 figs. Various types of bridges and drives employed; controls.

HARDNESS

Scleroscope for Testing. Recording Scleroscope and Pneumatic Release Pedal. Engineering, vol. 115, no. 2980, Feb. 9, 1923, pp. 185–186, 5 figs. New design brought out by Shore Instrument & Mfg. Co., Jamaica, N. Y.

HEAT TRANSMISSION

Determination of. New Methods and Investigations for Determining Heat Transmission, Oscar Knoblauch. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 131–132, 1 fig. Discussion of meaning of various coefficients of heat transmission and methods for their determination, including methods of measuring temperature of various elements entering into problem.

Rates. High Rates of Heat Transmission. Mar. Engr. & Naval Architect, vol 46, no. 545, Feb. 1923, pp. 48–51, 1 fig. Experimental results of rates in Diesel engines and German submarine engines; tables giving results of trials of Babcock & Wilcox boilers at various rates of combustion.

HEATING AND VENTILATION

Forge Shops. Forge Shop Heating and Ventilating, O. H. Bathgate. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 31–37, 8 figs. Problems encountered in heating and ventilating industrial buildings; comparison of natural and artificial ventilation; dust-collecting systems.

HELICOPTERS

De Bothezat. Successful Helicopter Trials at Mc. Cook Field. Aviation, vol. 14, no. 4, Jan. 22, 1923, p. 97, 1 fig. De Bothezat helicopter lifts 3600 lb. with 170-lb. Le Rhone engine.

HOBBING MACHINES

Operation. Hobbing-Machine Operation, John Edgar. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 179–180. Discusses major factors upon which successful operation of hobbing machines depends.

Testing. Testing Gear-hobbing Machines, D. V. Waters. Machy. (Lond.), vol. 21, no. 539, Jan. 25, 1923, pp. 523–525, 5 figs. Describes two types of testing fixtures for hobbing machines.

HOBS

Gear-Cutting. How to Use Gear-Cutting Hobs, S. O. Bjornberg. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, pp. 181–185 and (discussion) 185–187, 14 figs. Geometrical principles involved; testing instruments, and their application, which is termed quality control.

HOISTS

Blast-Furnace. Blast Furnace Hoist, Karl Möhringer. Eng. Progress, vol. 4, no. 2, Feb. 1923, pp. 25–27, 3 figs. Describes number of installations supplied by J. Pohlig A.-G., Cologne.

Skip. Automatic Skip Hoists for the Handling of Coal and Ashes, H. W. Stevens. Blast Furnace & Steel plant, vol. 11, no. 2, Feb. 1923, pp. 173–177, 3 figs. Types of skip hoists; motors and controllers for operating them.

HYDRAULIC TURBINES

Francis. Evaluation of the Characteristic Curves of Francis Turbines (Auswertung der Kennlinien von Francisturbinen), R. Müller. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 3, Jan. 20, 1923, pp. 57–58, 1 fig. Diagrammatic presentation of test results; calculation of loss of energy; determination of admission and discharge of water at rotor; calculation of effective admission and discharge radius of rotor.

Impulse vs. Reaction. Impulse Turbine versus Reaction Turbine for High Heads. Engineering, vol. 115, no. 2979, Feb. 2, 1923, pp. 129–130. Discusses factors entering into consideration of choice between two types.

Regulators. Turbine Regulators (Neuere Turbinenregler), Donath. Elektrotechnischer Anzeiger, vol. 39, nos. 195, 196 and 197, Dec. 7, 9 and 12, 1922, pp. 1521–1522, 1529–1530 and 1541–1542, 10 figs. Describes Schichau regulator for equalizing all changes in power consumption by opening or closing regulator so as only to use quantity of water corresponding to power required.

Small Plants. Typical Water Turbines for Small Plants, S. C. O'Grady. Beama, vol. 12, no. 57, Jan. 1923, pp. 12–18, 5 figs. Deals with open-fume turbines. Examples of low-head plants; regulation; governors; prices and specifications.

Meters, Water
* General Electric Co.
* H.S.B.W.-Cochrane Corp'n
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ridgway Dynamo & Engine Co.

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Shepard Electric Crane & Hoist Co.

Motors, Synchronous
* Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Non-Return Valves
(See Valves, Non-Return)

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Nuts, Machine Screw (Steel & Brass)
* Reed & Prince Mfg. Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Lunkenheimer Co.

Oil and Grease Guns
* Royersford Foundry & Machine Co.

Oil Burners, Engines, Filters, Pumps, Separators, etc.
(See Burners, Engines, Filters, Pumps, Separators, etc., Oil)

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Improved Equipment Co.
* Schutte & Koerting Co.
Todd Shipyards Corp'n

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Tanks
* Scaife, Wm. B. & Sons Co.

Oil Well Machinery
* Brownell Co.
* Ingersoll-Rand Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Oilers, Sight Feed
* Lunkenheimer Co.

Oiling Devices
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oiling Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oils, Fuel
Texas Co.

Oils, Lubricating
Texas Co.
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co
Link-Belt Co.

Ovens, Core
Whiting Corporation

Overhead Track System
(See Tramrail Systems, Overhead)

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
Linde air Products Co.

Packing, Ammonia
France Packing Co
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Packing, Asbestos
Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Packing, Rubber
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)

Packing, Sheet
* Goetze Gasket & Packing Co.
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Paint, Metal
* General Electric Co.
* Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paper Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
DuPont Engineering Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
Dixon, Joseph Crucible Co.
Keuffel & Esser Co.

Penstocks
Smith, S. Morgan Co.

Perforated Metals
(See Metals, Perforated)

Petroleum Products
Texas Co.

Pile Drivers
Clyde Iron Works Sales Co
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* United States Cast Iron Pipe & Fdry. Co.

Pipe Cutting-off Machines
Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Pipe Joint Clamps
(See Clamps, Pipe Joint)

Pipe, Riveted
* American Spiral Pipe Wks.
* Titusville Iron Works Co
* Walsh & Weidner Boiler Co.

Pipe, Riveted Steel
* Springfield Boiler Co.

Pipe, Soil
* Central Foundry Co

Pipe, Steel
* Crane Co.

Pipe, Welded
* American Spiral Pipe Wks.
* Crane Co.
* Pittsburgh Valve, Foundry & Construction Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Pittsburgh Valve, Foundry & Construction Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Plate Metal Work
(See Steel Plate Construction)

Pneumatic Tools, Tubes, etc.
(See Tools, Tubes, etc., Pneumatic)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Foundry & Machine Co.

Poppet Valve Engines
(See Engines, Steam, Poppet Valve)

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Chain Belt Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Jones, W. A. Fdry. & Mch. Co
Link-Belt Co.
* Medart Co.
* Morse Chain Co.
Poole Engrg. & Mch. Co.
* Royersford Foundry & Machine Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
Philadelphia Drying Machinery Co.

Presses, Blanking
* Bliss, E. W. Co.

Presses, Draw
* Bliss, E. W. Co.

Presses, Extruding
* Bliss, E. W. Co.

Presses, Foot
* Bliss, E. W. Co.
* Royersford Foundry & Machine Co.

Presses, Forging
* Bliss, E. W. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Machinery Co.

Presses, Punching and Trimming
* Bliss, E. W. Co.
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Presses, Sheet Metal Working
* Bliss, E. W. Co.

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Worthington Pump & Machy Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Machine Co
Link-Belt Co.
* Medart Co.
Wood's, T. B. & Sons Co.

Pulleys, Iron
Brown A. & F. Co.
* Falls Clutch & Machinery Co
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mch. Co
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
Kenworthy, Chas. F. (Inc.)

Pulverized Fuel Feeders
(See Feeders, Pulverized Fuel)

Pulverizers
Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Outfits
Novo Engine Co.

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co
* Ingersoll-Rand Co.
* Titusville Iron Works Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co

Pumps, Ammonia
Buffalo Steam Pump Co
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Vogt, Henry Machine Co
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
* Morris Machine Works.
Novo Engine Co.
Taber Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

HYDROELECTRIC PLANTS

Austria. Proposed Superpower Plant at Lake Achen (Das projektierte Achensee-Grosskraftwerk). Hans Hellrigl. Elektrotechnik u. Maschinenbau, vol. 40, no. 36, Sept. 3, 1922, pp. 425-426, 1 fig. Hydrological conditions; water-power resources of lake and their management; plants to connect up to hydroelectric power in Austrian Tyrol; details of work under construction.

California. The Pit River Power and 220,000-Volt Transmission Problem, Frank G. Baum. Elec. World, vol. 81, nos. 4 and 5, Jan. 27 and Feb. 3, pp. 205-212 and 262-267, 19 figs. Analysis of California power problem which involved transmission and economic questions of unprecedented magnitude. Jan. 27: Line regulation and insulation; Vaca substation. Feb. 3: Power possibilities of system; Hat Creek and Pit River plants.

Kearney, Neb. Design Reduces Cost of Small Hydro Plant. Elec. World, vol. 81, no. 3, Jan. 20, 1923, pp. 144-146, 4 figs. Unusual ground conditions make conventional designs difficult of application to Kearney (Neb.) plant, hence unique plan is adopted. Canal conveys water 16 mi. for irrigation and power purposes; power plant develops 1500 kw. with 54-ft. head.

Remote Control. Remote Control Made Possible Economical Development of a Small Water Power, R. Philip Hart. Power, vol. 57, no. 5, Jan. 30, 1923, pp. 162-165, 10 figs. Water-power site used by old mill and abandoned was redeveloped with remotely controlled station and operated in parallel with another plant 3000 ft. away.

Safeguarding Workmen. Safeguarding Workmen in Hydro-Electric Stations, Ralph Brown. Power, vol. 57, no. 8, Feb. 20, 1923, pp. 280-284, 9 figs. Describes method closely patterned after that at Holtwood Station of Pa. Water & Power Co.

Small. The Electric System for Small Water-Powers, William T. Taylor. Elec. Rev., vol. 92, no. 2354, Jan. 5, 1923, pp. 5-8, 3 figs. Discusses mill-site type, type equipped with regular hydroelectric machinery, and type where hydroelectric plant is controlled from distant points.

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ICE PLANTS

Raw-Water Air-Agitating Systems. Air Agitating Systems for Raw Water Ice Manufacture, H. R. Haltermann. Ice & Refrigeration, vol. 63, no. 6, Dec. 1922, pp. 341-343. Discusses various types of low-pressure and high-pressure systems. Paper read before Nat. Assn. Practical Refrig. Engrs.

IGNITION

Battery. Battery Ignition, A. Mortimer Codd. Automobile Engr., vol. 13, no. 173, Feb. 1923, pp. 42-44, 9 figs. Points out that if battery ignition be made with same scrupulous care as magneto and design not sacrificed to cheapness, it will give superior results. Points to be considered.

INDICATORS

Internal-Combustion-Engine. Indicators. Engineer, vol. 135, no. 3500, Jan. 26, 1923, pp. 100-102, 7 figs. Two papers read before Instn. Mech. Engrs., as follows: Micro-Indicator for High-Speed Engines, W. G. Collins; R. A. E. Electrical Indicator for High-Speed Internal Combustion Engines, and Gauge for Maximum Pressures.

INDUSTRIAL MANAGEMENT

Automobile Service Station. Modern Methods in "Service" Industries, Louis G. Rowe. Indus. Management (N. Y.), vol. 65, no. 2, Feb. 1923, pp. 77-83, 4 figs. Outlines method for applying proved principles of management in field of automobile service and repair station.

Equipment Records. Why Not an Equipment Register? Morgan C. Farrell and Johnson Heywood. Factory, vol. 29, no. 6, Dec. 1922, pp. 662-664 and 700, 1 fig. Describes appearance and operation of equipment record, and savings to be effected, by preventing overpayment of taxes, showing up excessive repair bills, etc.

Machine Shops. Mechanical and Electrical Work shops at Tarbes (Ateliers de constructions mecaniques et electriques de Tarbes). Ouvrier Moderne, vol. 5, no. 10, Jan. 1923, pp. 389-394, 5 figs. Shop management methods at new works of Constructions Electriques de France, manufacturing electric locomotives and railway motor cars, electric generating machinery, and hydraulic turbines; very modern establishment.

Power Plants. Modern Management Methods in the Power Plant, Browning Robinson. Indus. Management (N. Y.), vol. 65, no. 2, Feb. 1923, pp. 121-125, 1 fig. Getting cooperation from fireroom gang.

Power-Service Maintenance. Report on Practice in Maintenance Work, E. H. Hubert. Indus. Engr., vol. 81, no. 1, Jan. 1923, pp. 27-31 and 36, 1 fig. How 74 companies handle inspections, repairs and maintenance supplies.

Progress, 1912-1922. Ten Years of Scientific Management, John G. Aldrich. Management Eng., vol. 4, no. 2, Feb. 1923, pp. 87-93, 12 figs. Few changes in system are recorded.

Quality Control. Quality Products, G. S. Radford. Management Eng., vol. 4, no. 2, Feb. 1923, pp. 111-116, 3 figs. Control methods of leading manufacturers used to maintain standards.

Repair Department, Systematizing. Systematizing the Repair Department, L. F. Libgotte. Indus. Management (N. Y.), vol. 65, no. 2, Feb. 1923, pp. 101-109, 5 figs. How repair department was reorganized in large factory in France.

Rubber Mill. Industrial Management, Arthur T. Hopkins. India Rubber World, vol. 67, no. 4, Jan. 1, 1923, pp. 221-223. Economic management of rubber mill; notes on purchasing, production, manufacturing economies, personnel, merchandising, and finance.

Shipping Methods. How System Eliminates Red Tape, O. A. Parmenter. Indus. Management (N. Y.), vol. 65, no. 2, Feb. 1923, pp. 110-113, 4 figs. Making savings in shipping methods.

Toolroom Organization. The Function of the Toolroom from Constructive and Administrative Viewpoint (Die Aufgabe des Werkzeugbüros in konstruktiver und verwaltungstechnischer Hinsicht), Wilhelm Kropff. Werkstattstechnik, vol. 16, no. 22, Nov. 15, 1922, pp. 673-680, 24 figs. Proper selection of workshop devices with special regard to standardization of gages. Control of tools and arrangement of toolroom.

[See also COST ACCOUNTING; TIME STUDY.]

INTERNAL-COMBUSTION ENGINES

Four-Cylinder, Classification of. Classification and Designation of Multi-Cylinder Light Engines (Einteilung und Benennung der vielzylindrigen Leichtmotoren), H. Schrön. Motorwagen, vol. 25, no. 31, Nov. 10, 1922, pp. 589-595, 22 figs. Usual classification; classification according to crank and cylinder diagram; and according to motion-geometrical aspects; thrust direction of connecting rod and dead-center line as designations of classification.

Governors. The Ramsay Marine Governor. Mar. Engr. & Naval Architect, vol. 46, no. 544, Jan. 1923, pp. 15-16, 3 figs. Description and method of operation of apparatus applicable to combustion engines.

Heavy Fuels. Group Session on "The Present Status and Probable Development of Internal Combustion Engines to Consume Heavy Fuels." Am. Petroleum Inst.—Bul., vol. 3, no. 62, Dec. 30, 1922, pp. 129-150, 3 figs. Remarks by Henry L. Doherty, Harte Cooke, F. W. Gay, W. G. Gernandt, C. E. Lucke, Carl A. Norman, Max Rotter, Arthur West, W. P. Dempsey and A. C. Goldingham.

Lifeboats. A New Lifeboat Engine. Mar. Engr. & Naval Architect, vol. 46, no. 544, Jan. 1923, pp. 21-28, 17 figs. Royal Nat. Lifeboat Instn's vertical water-cooled six-cylinder type, rated at 80 b.hp.; general description, ignition, lubrication, control, ventilation, starting, cooling system.

Lineshafts and Air Containers. Revision of Rules for Internal-Combustion Engines, Joseph Hecking. Motorship, vol. 8, no. 1, Jan. 1923, pp. 51 and 52. Modifications in rules for lineshafts and air containers for internal-combustion engines.

Marine. Review of Different Types of Marine Internal-Combustion Engines. North-East Coast Instn. Engrs. & Shipbldrs., advance paper, no. 1310SQ, for meeting Jan. 12, 1923, 20 pp., 7 figs. on supp. plates. Descriptions of following engines: Armstrong-Sulzer Diesel engine; Camellaird-Fullagar, Doxford opposed-piston; Neptune and Scott-Still marine oil engines; and Vickers internal-combustion engine.

Still. The Still Engine (Der Still-Motor). Wärs. Motor u. Auto, vol. 19, nos. 23-24, Dec. 20, 1922, pp. 287-288, 1 fig. An oil engine with combustion cylinder and steam cylinder; design and operation.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES; SEMI-DIESEL ENGINES.]

IRON AND STEEL

Direct Process. Production of Iron and Steel Direct from the Ore, Ralph Whitfield. Iron & Coal Trades Rev., vol. 106, no. 2862, Jan. 5, 1923, pp. 6-7, 6 figs. Study of proposals of Coureoud, in view of apparent failure of Basset proposals.

India. The Indian Iron and Steel Industry and Its Probable Development, J. V. McCartney. Blast Furnace & Steel Plant, vol. 11, no. 2, Feb. 1923, pp. 140-144, 11 figs. Review of growth of iron and steel manufacture in India; modern steel plants are successful in making high-grade products very cheap because of economic advantages.

Metallurgy 1922. Developments in Metallurgy of Iron and Steel, S. L. Goodale and Kenneth D. Dodd. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 4-6. Report of important achievements recorded in current periodicals and presented as papers before national societies during 1922.

Sulphur Determination. The Determination of Sulphur by Combustion in a Stream of Oxygen, A. Vita. Forging & Heat Treating, vol. 8, no. 12, Dec. 1922, pp. 557-559. Analytical determination of sulphur in pig iron, steels, ores, slags and fuels by combustion in a stream of oxygen; discusses special cases and limitations.

IRON CASTINGS

High-Silicon. Acid Resisting Metal Unique, H. E. Diller. Foundry, vol. 51, no. 2, Jan. 15, 1923, pp. 47-52, 10 figs. Castings made of high-silicon iron melted and remelted in air furnace with addition of 50 per cent ferrosilicon; metal hard and brittle, easily welded, but not machineable.

Internal Chill. Internal Chill in Castings, J. E. Hurst. Foundry Trade Jl., vol. 27, no. 337, Feb. 1, 1923, pp. 85-87, 1 fig. It is believed that phenomena of internal chill can be attributed to lag or period of time which elapses in cooling down of cast iron before maximum rate of cooling is attained.

IRON, PIG

Grading. The Grading of Pig-Iron, H. H. Shepherd. Foundry Trade Jl., vol. 27, no. 334, Jan. 11, 1923, pp. 25-26, 3 figs. System of grading by means of combination of analytical and fracture systems.

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LABOR

Problems on Railroads. The Labor Problem on the Railroads, Charles H. Stein. N. Y. Railroad Club—Proc., vol. 33, no. 1, Dec. 1922, pp. 6846-6855. In author's belief, interests of public in respect to labor problem on American railroads will require existence of U. S. Railroad Board, provided that by congressional action necessary teeth are incorporated in act.

LABOR TURNOVER

Causes and Cost. Labor Turnover Causes Economic Waste, W. C. West. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 11-13. Cost and cause of excessive labor turnover; suggestions for reducing turnover.

LATHES

Railway-Wheel. Modern Wheel Production (Neuzeitliche Bearbeitung von Radsätzen), O. Krupski. Organ für die Fortschritte des Eisenbahnwesens, vol. 77, no. 20, Oct. 15, 1922, pp. 303-307, 6 figs. Lathes for turning wheels and tires, and description of operations.

Turret. Using the Turret Lathe for Small Lots, Albert A. Dowd. Machy. (N. Y.), vol. 29, no. 6, Feb. 1923, pp. 424-429, 12 figs. Examples showing how small quantities of castings and forgings can be machined economically on turret lathe.

LOCOMOTIVES

Accidents. Locomotive Accident Report. Ry. & Locomotive Eng., vol. 36, no. 2, Feb. 1923, pp. 31-32, 1 fig. Report of Bur. of Locomotive Inspection issued by Interstate Commerce Commission.

Balanced Compound. Economy of Four Cylinder Balanced Compound Locomotives, W. E. Symons. Ry. & Locomotive Eng., vol. 36, no. 2, Feb. 1923, pp. 53-54. Features of refinement in design; objection to additional parts; improvements.

Baldwin. Powerful Baldwin Locomotives for Western Maryland Railway. Ry. Gaz., vol. 38, no. 3, Jan. 19, 1923, pp. 88-90 and 100, 5 figs. Designs establishing new weight and tractive-effort records developed in connection with locomotives supplied to West. Maryland Ry.; designed to operate on 90-lb. rails, traverse curves of 22 deg., and negotiate grades of 3½ per cent.

Compressed-Air. Compressed Air Locomotives, H. Schulte. Eng. Progress, vol. 4, no. 1, Jan. 1923, pp. 1-5, 9 figs. Development; types; working process; working pressure; air consumption; tunnel locomotives.

Compressed-Air Locomotives of Old and Recent Types (Druckluft-Lokomotiven älterer und neuerer Bauart). Gewerbefleiss, vol. 101, no. 12, Dec. 1922, pp. 344-348, 8 figs. Review of development of modern types, and examples of their application, especially in mining; production of compressed air up to 200 atmos. pressure by special 5-stage compressors.

Design and Construction. Some Features of Boiler Design and Construction in Relation to Upkeep, A. E. Keyffin. Ry. Engr., vol. 44, no. 516, Jan. 1923, pp. 28-29. Tube arrangements; water-space stays; firebox crown stays; firehole and foundation ring; flanged plates; tubes; washout arrangements; steam domes. (Abstract.) Paper read before Instn. Locomotives Engrs.

Diesel-Electric. Diesel-Electric Locomotives and Railway Motor Cars (Locomotive ed automotrici benzo-elettriche), D. F. Spani. Elettrotecnica, vol. 9, no. 35, Dec. 15, 1922, pp. 804-805, 4 figs. Construction and operation of some American and Swedish types; advantages.

Is the Steam Locomotive Out of Date, L. G. Coleman. N. E. R. R. Club, Jan. 9, 1923, pp. 190-199 and (discussion) 199-239, 3 figs. Points out that weakness of steam locomotives is its boiler, and discusses possibilities for use of Diesel or gas engine as power plant. See (Abstract) in Ry. Mech. Engr., vol. 97, no. 2, Feb. 1923, pp. 92-94.

Drawbars. The Design of Engine and Tender Drawbars, H. J. Coventry. Ry. Mech. Engr., vol. 97, no. 2, Feb. 1923, pp. 87-89, 2 figs. Comments on existing practice with suggestions for more logical basis of design.

Fireless. Heavy Plates Used in Fireless Locomotive, C. E. Lester. Boiler Maker, vol. 23, no. 1, Jan. 1923, pp. 1-3, 2 figs. Details of construction of tank of largest fireless steam locomotive ever built.

Freight. The Super Locomotive, No. 8000. Mich. Technic, vol. 36, no. 1, Nov. 1922, pp. 19-21, 3 figs. New type of superheater used in locomotive put in service on Mich. Central R. R. for movement of heavy fast freight trains.

Mikado. Some Representative Mikado Type Locomotives Built in 1922. Ry. Rev., vol. 72, no. 3, Jan. 20, 1923, pp. 139-142, 8 figs. Particulars and illustrations of representative locomotives.

Pacific. G. N. R. Three-Cylinder Pacific Locomotive. Engineer, vol. 135, no. 3500, Jan. 26, 1923, pp. 90, 92 and supp. plate. Presents drawings of locomotive which was described in same journal, Apr. 14, 1922.

New Locomotives for the Alabama & Vicksburg. Ry. & Locomotive Eng., vol. 36, no. 2, Feb. 1923, pp. 33-34, 6 figs. Pacific and Mikado types, feature of which is interchangeability of parts.

Rods, Milling. Milling Locomotive Rods. Machy. (Lond.), vol. 21, no. 539, Jan. 25, 1923, pp. 531-534, 8 figs. Results of tests conducted in United States to determine possibilities of reducing costs in locomotive shops by milling.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
Novo Engine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Dry Vacuum
(See Pumps, Vacuum)

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Filter Press
Buffalo Steam Pump Co.
* Goulds Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring
Wayne Tank & Pump Co.

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Pumps, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lunkenheimer Co.
Novo Engine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Oil (Hand)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Novo Engine Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Novo Engine Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co
* Ingersoll-Rand Co.
* Morris Machine Works
* Smidth, F. L. & Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Morris Machine Works.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Punches, Metal Hand (Power)
* Parker-Kalon Corp'n

Punches, Multiple
* Bliss, E. W. Co.
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Punches, Power
* Bliss, E. W. Co.
* Royersford Fdry. & Mch. Co.

Punches and Dies
* Bliss, E. W. Co.
* Royersford Fdry. & Mch. Co.

Punching and Coping Machines
Long & Allstatter Co.

Punching and Shearing Machines
* Bliss, E. W. Co.
Long & Allstatter Co.
* Royersford Fdry. & Mch. Co.

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Elliott Co

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Superheater Co
Taylor Instrument Cos.

Pyrometers, Optical
Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co

Pyrometers, Radiation
Taylor Instrument Cos.

Racks, Machine, Cut
* Brownell Co
* James, D. O. Mfg. Co
* Jones, W. A. Fdy. & Mch. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Railways, Industrial
Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Condenser & Engineering Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recorders, CO
* Uehling Instrument Co.

Recorders, CO_2
* Uehling Instrument Co.

Recorders, SO_2
* Uehling Instrument Co.

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Refuse Destructors
(See Destructors, Refuse)

Regulators, Blower
* Davis, G. M. Regulator Co.

Regulators, Damper
* Fulton Co.
* Kieley & Mueller (Inc.)
* Parker-Kalon Corp'n

Regulators, Electric
* General Electric Co.

Regulators, Feed Water
Elliott Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Humidity
* Fulton Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
* Fulton Co.
* General Electric Co.
* Kieley & Mueller (Inc.)
Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
Taylor Instrument Cos.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
Long & Allstatter Co.

Rivets (Steel, Brass & Copper)
* Reed & Prince Mfg. Co.

Roller Bearings
(See Bearings, Roller)

Rolling Doors and Shutters
(See Doors and Shutters, Steel or Wood Rolling)

Rolling Mill Machinery
Mackintosh-Hemphill Co.

Rolls, Crushing
Link-Belt Co
* Worthington Pump & Machinery Corp'n

Rolls, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
* Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
* Johns-Manville (Inc.)

Rope Drives
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rubber Goods, Mechanical
Goodrich, B. F. Rubber Co.
* Jenkins Bros
United States Rubber Co.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Saw Rigs, Portable
Novo Engine Co.

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
* Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
* Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Traveling
* Chain Belt Co.

Screens, Water Intake (Traveling)
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Cap & Set
Allen Mfg. Co.
* Reed & Prince Mfg. Co.

Screws, Cap & Set (Steel)
* Reed & Prince Mfg. Co.

Screws, Drive (Hardened)
* Parker Kalon Corp'n

Screws, Machine (Steel and Brass)
* Reed & Prince Mfg. Co.

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker-Kalon Corporation

Screws, Wood (Steel, Brass and Bronze)
* Reed & Prince Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Mchy. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Co.

Shafting, Flexible
* Gwilliam Co.

Shafting, Turned and Polished
Cumberland Steel Co.
Link-Belt Co.

Shapes, Brick
McLeod & Henry Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co

Sharpening Devices, Rock Drill
* Ingersoll-Rand Co.

Shears, Alligator
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Shears, Plate
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Shears, Squaring
* Bliss, E. W. Co.

Sheaves, Rope
Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheet Metal Working Machinery
* Bliss, E. W. Co.

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Tank. Heavy Tank Locomotives for Service in Germany. Ry. Gaz., vol. 38, no. 2, Jan. 12, 1923, p. 49. 1 fig. 2-10-2-type tank locomotive, built by A. Borsig, Berlin, for Halberstadt-Blankenburg Ry.

LUBRICANTS

Manufacture. Manufacture of Lubricants. Oil News, vol. 10, no. 23, Dec. 5, 1922, pp. 19–20. How neutral oils, cylinder stocks, petrolatums, and wax are made; importance of still and "cut"; uses of petrolatum. Reprinted from Atlantic Lubricator.

LUBRICATING OILS

Specifications. Lubricating-Oil Specifications. Harold Moore. Instn. Min. Engrs.—Trans., vol. 64, part 3, Dec. 1922, pp. 74–78. Notes on drafting of specifications for supply of lubricants.

LUBRICATION

Cylindrical-Journal. On the Characteristics of Cylindrical Journal Lubrication at High Values of the Eccentricity. T. E. Stanton. Roy. Soc.—Proc., vol. 102, no. A 716, Dec. 1, 1922, pp. 241–255, 6 figs. Investigation to obtain more definite information on nature of action between two lubricated surfaces when value of intensity of pressure as defined by load (area of lubricated surface) is considerably higher than that normally attained in current practice with cylindrical journals.

Grease Gun for Bearings. The "Enots" Machinery Grease Gun. Machy. (Lond.), vol. 21, no. 538, Jan. 18, 1923, pp. 494–495, 2 figs. New type used for greasing bearings in all kinds of machinery and factory equipment generally.

Journal Boxes. Successful Lubrication of Journal Boxes. W. J. O'Connor. Ry. Mech. Engr., vol. 97, no. 2, Feb. 1923, pp. 106–108. Paper read before Chief Interchange Car Inspector's and Car Foremen's Assn. of Am., and discussion.

M

MACHINE SHOPS

Gand, France. The Carels Machine Shops at Gand (Les usines de constructions méchaniques Carels, à Gand). M. Bochet. Génie Civil, vol. 82, no. 2, Jan. 13, 1923, pp. 25–29, 11 figs. partly on supp. plate. Works of Société de l'Electricité et de Mécanique; describes two- and four-stroke Diesel-Carels engines.

MACHINE TOOLS

Handles, Pressed-Steel. Pressed-steel Machine Handles. Fred R. Daniels. Machy. (N. Y.), vol. 29, no. 6, Feb. 1923, pp. 466–468, 6 figs. Process for manufacturing hollow seamless machine handles.

Making Handles from Strip Steel. Herbert R. Simonds. Iron Trade Rev., vol. 72, no. 7, Feb. 15, 1923, pp. 505–507 and 510, 8 figs. Machine-tool handles formerly made from castings now produced on forming presses utilizing special dies; 12 operations required to turn raw material into finished product; details of process.

Pull or Push Cutting Stroke. Pull or Push Cutting Strokes. Mech. World, vol. 73, no. 1879, Jan. 5, 1923, pp. 2–3, 3 figs. Discusses problem as to whether cut shall be taken on pulling or pushing stroke on certain types of machine tools, possessing holders or rams carrying tool out from end.

Triplex Universal. The Triplex Universal Machine Tool. Engineering, vol. 115, no. 2978, Jan. 26, 1923, p. 118, 6 figs. partly on p. 110. Describes machine which may be used for many purposes, such as turning, milling and drilling, either vertical or angular.

MACHINERY

Depreciation. Some Economic Phases of Engineering. George F. Marsteller. Elec. World, vol. 81, no. 4, Jan. 27, 1923, pp. 217–219, 1 fig. Methods of evaluating increase of equipment efficiency in studies of plant design; mathematical formulas developed for such studies.

Foundation Vibrations. Investigations of the Oscillations of Foundations (Untersuchungen über Fundamentschwingungen), Ernst Schmidt. Zeit. des Vereines deutscher Ingenieure, (supp. sheet), vol. 67, no. 2, Jan. 13, 1923, pp. 33–35, 11 figs. Oscillations caused by periodical forces of machines are investigated by means of graphic representation of oscillating magnitudes through vectors; investigation of behavior of elastic machine foundations of cork and rubber. Experimental results.

MAGNETOS

American Bosch. New American Bosch Magneto Model Has Novel Frame Construction. P. M. Heldt. Automotive Industries, vol. 48, no. 6, Feb. 8, 1923, pp. 278–280, 3 figs. New design embodies one-piece die-cast frame and is lighter and more compact than previous types.

Parts, Manufacture of. The Manufacture of Magneto Parts. W. Richards. Machy. (Lond.), vol. 21, no. 539, Jan. 1923, pp. 520–522, 4 figs. Describes production of magneto contact breaker lever and collector ring.

MALLEABLE IRON

European Production Processes. European View of Malleable. T. Levoz. Foundry, vol. 51, no. 2, Jan. 15, 1923, pp. 58–60. Iron oxide principal factor in producing poor malleable; thoroughly deoxidized metal will run well; French triplexing process and results of tests. Paper presented before Am. Foundrymen's Assn. through courtesy of Assn. Technique de Fondérie de France.

Motor Castings. Permeability of Malleable High. Iron Trade Rev., vol. 72, no. 3, Jan. 18, 1923, pp. 231–232, 3 figs. Magnetic properties make it suitable for frames of small motors and generators used on automobiles.

MANOMETERS

Ventilation Measurements. A Precise Manometer for Ventilation Measurements, Walter S. Weeks. Min. & Metallurgy, vol. 4, no. 193, Jan. 1923, pp. 19–22, 8 figs. Details and operation of manometer developed by author.

MEASURING INSTRUMENTS

Test Code. Test Code on Instruments and Apparatus. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 116–120, 5 figs. Preliminary draft of chapters 1 and 2, dealing respectively with general considerations and with accuracy of measuring instruments, being first installment of this A.S.M.E. power test code to be published.

Torsiograph and Vibrograph. The Torsiograph and Vibrograph and Measuring Results Obtained Therewith (Torsiograph und Vibrograph und neuere mit denselben gewonnene Messergebnisse), Jos. Geiger. Maschinenbau, vol. 2, no. 5–6, Dec. 16, 1922, pp. G69–G75, 41 figs. Describes torsiograph for investigations of torsional oscillations and vibrograph for registration of straight movements, and their general usefulness for technical purposes. A number of diagrams are presented showing varied uses of apparatus.

METALS

Diseases. Diseases and Special Properties of Metals (Metallkrankheiten und besondere Metalleigenschaften). Heinz Lange. Zeit. fur die Gesamte Giessereipraxis, vol. 43, no. 50–51, Dec. 30, 1922, pp. 181–182 (Das Metall Section). Discusses diseases of tin, zinc and iron; disintegration of tin into powder, a contagious disease; corrosion of iron, etc.

Progress 1922. The Year's Progress in Metals. Metal Industry (N. Y.), vol. 21, nos. 1 and 2, Jan. and Feb. 1923, pp. 9–10 and 60–61. Annual bibliographical review of progress made in metals, their alloys, and their application to industrial arts.

METRIC SYSTEM

Features and Advantages Claimed. The International Metric System of Weights and Measures. U. S. Bur. of Standards, Miscellaneous Publications, no. 2, Sept. 21, 1922, 16 pp., 6 figs. Report prepared to answer questions addressed to Bur. of Standards.

MILLING MACHINES

Tool Fastening. The Standardization of Tool Fastening to Milling Machines (Die Normung der Werkzeugbefestigung an Frasmaschinen), K. Hegner. Werkstattstechnik, vol. 17, no. 1, Jan. 1, 1923, pp. 1–6, 46 figs. Recommendations of Standard Committee of Assn. German Machine-Tool Mfrs. for standardization of tool fastenings.

MOLDING METHODS

Flanged Bushings. Molding Flanged Bushings, Charles Vickers. Foundry, vol. 51, no. 3, Feb. 1, 1923, pp. 97–100, 4 figs. Advantages and disadvantages of molding with flange up or down; different kinds of gates are illustrated.

MOTOR BUSES

Bodies. Bus Bodies Took Big Forward Strides in 1922. Bus Transportation, vol. 2, no. 1, Jan. 1923, pp. 15–21, 10 figs. Roof construction; doors and windows; lighting and heating; seating arrangements; fittings.

Chassis. Progress in Construction of Motor-Bus Chassis, Cornelius T. Myers. Bus Transportation, vol. 2, no. 1, Jan. 1923, pp. 11–15, 5 figs. Fundamental details of design; accessibility in chassis; controls; transmissions; engines; considerations of comfort; cutting operating costs.

One-Man-Operated. A Cheap-Operation Single-Decker. Motor Transport, vol. 36, no. 932, Jan. 8, 1922, pp. 34–35, 4 figs. Bus designed for poorer-paying routes of Manchester Corp. Tramways; to be worked without conductor.

Reconditioning. Re-conditioning Motor Buses. Machy. (Lond.), vol. 21, nos. 536 and 537, Jan. 4 and 11, 1923, pp. 417–425 and 449–453, 15 figs. Details of system adopted by Lond. Gen. Omnibus Co.; Ltd., Chiswick Works, Gunnersbury.

Six-Wheel. The Six-Wheel Autobuses of Paris (Les omnibus automobiles à six rous, de Paris). Génie Civil, vol. 81, no. 27, Dec. 30, 1922, pp. 605–607, 11 figs. Design, construction, and operation; power of suspensions; control of wheels; 34-hp. motors.

MOTOR TRUCKS

Brussels Show. The Brussels Show. Motor Transport, vol. 36, no. 934, Jan. 22, 1923, pp. 93–98, 9 figs. Survey of the more interesting business motor vehicles exhibited.

Electric, Possibilities and Future. Electric Trucks. Elec. Jl., vol. 20, no. 1, Jan. 1923. Contains following articles: The Possibilities of the Electric Motor Truck, Charles R. Skinner, Jr., pp. 7–9, 2 figs.; Future of the Electric Commercial Truck, A. E. Friedgen, pp. 10–12, 5 figs.; The Field for Electric Trucks, G. A. Freeman, pp. 12–15, 4 figs.; Features of Design of Electric Trucks, J. C. Carroll, pp. 16–20, 4 figs.; Storage Batteries and Charging for Electric Vehicles, J. H. Tracey, pp. 20–22, 3 figs.; The Electric Vehicle Motor, A. L. Broomall, pp. 23–27, 11 figs.; Charging Vehicle Batteries, Otto Sarvas, pp. 27–30, 9 figs.; Control Equipment for Electric Vehicles, A. Robinson, pp. 34–36, 7 figs.; etc.

O

OFFICE MANAGEMENT

Paper for Forms. Standard Sheets of Paper for Forms, C. L. Barnum. Management Eng. vol. 4, no. 2, Feb. 1923, pp. 117–119. Gives examples of standard sizes that cut and print without waste from flat papers.

OIL ENGINES

Battery-Charging Sets. Small Oil Engine Battery-Charging Sets, W. Wilson. Beama, vol. 11, nos. 5 and 6, Nov. and Dec. 1922, pp. 723–730, 801–810 and vol. 12, no. 57, Jan. 1923, pp. 39–43, 15 figs. Nov.: Characteristics of leadaccumu lator; standard non-automatic house-lighting equipment; defects of old and improvements in more recent plants; components involved in lighting sets. Dec.: Regulation of current during charge; automatic cessation of charge; automatic starting; engines, dynamos and types of loads. Jan.: Examples of complete apparatus.

Cold-Starting. Vertical Cold-Starting Solid-Injection Oil Engines. Engineering, vol. 115, no. 2979, Feb. 2, 1923, pp. 153–155, 5 figs. partly on p. 152. Ruston heavy-oil engine designed for continuous working load of 380 b.hp. at 250 r.p.m.

Compressorless. Compressorless Oil Engines (Kompressorlose Oelmaschinen), F. P. Grützner. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 3, Jan. 20, 1923, pp. 53–56, 11 figs. Describes 4-cycle engine with pump injection; details of fuel valve and pump and regulation; experimental results and practical experiences.

Exhaust-Gas Utilization. Utilization of Oil-Engine Exhaust Gases. J. L. Chaloner. Motorship, vol. 8, no. 1, Jan. 1923, pp. 16–18 and 24, 3 figs. Heat balance sheet of an oil engine; exhaust gases and their heat value, temperatures, specific heat, heat available; available heat in jacket-cooling water.

Hot-Bulb. A Belgian Hot Bulb Engine with the R. E. M. Type Fuel Pump. Engineer, vol. 135, no. 3501, Feb. 2, 1923, p. 120, 2 figs. Deals with third and fourth series of engines built by Anglo-Belgian Co., Ghent, comprising engines of 25, 50 and 75 hp. designed for speed of 380 r.p.m., and engines of 100, 150 and 200 b.hp. running at 280 r. p.m.

OIL FUELS

Burning, Efficient. The Practical Use of Oil Fuels, Allen F. Brewer. Combustion, vol. 8, no. 2, Feb. 1922, pp. 94–97 and 104. Characteristics of oil fuel.

Combustion. Judging the Combustion of Liquid Fuels, A. G. Witting. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 125–127. Formula for calculating results of combustion from waste-gas analysis applied to liquid fuels; by-product tar used as typical example; moisture calculation not essential.

OPEN-HEARTH FURNACES

Loftus System. Improvements in Open Hearth Furnace, E. C. Cook. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 61–64, 3 figs. Describes Loftus variable-pressure method of firing and briefly explains Naismith mechanical neutral joint.

Sulphur Control in Basic. Control of Sulphur in the Basic Open Hearth Process, Sylvester V. Williams. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 51–54. Excessively high temperatures necessary to remove all sulphur; reduction at blast furnace advantageous; selection of low-sulphur fuels should be carefully watched.

OXY-ACETYLENE CUTTING

Cast Iron. Applications of the Cutting of Cast Iron with the Oxy-Acetylene Torch, A. S. Kinsey. Am. Welding Soc.—Jl., vol 2, no. 1, Jan. 1923, pp. 21–33, 8 figs. Typical examples of cutting cast iron; economy and method of cutting; effects on cast iron; theory of cutting metals with gas.

OXY-ACETYLENE WELDING

Sheet Metal. Production Welding in the Sheet Metal Shop, J. W. Owens. Am. Welding Soc.—Jl., vol. 2, no. 1, Jan. 1923, pp. 41–44, 4 figs. Welding with gas flames in manufacture of metal furniture.

P

PIPING

Power Plants. Power Plant Piping, G. W. Smith. Nat. Engr., vol. 27, no. 1, Jan. 1923, pp. 4–7. Pipe sizes, valves, fittings, gaskets, bolts, hangers, drainage and expansion. Paper read before N. A. S. E. convention.

PISTONS

Aluminum. Aluminum Alloy Pistons. Metal Industry (Lond.), vol. 22, no. 3, Jan. 19, 1923, p. 3. Discusses difficulties in their use; thermal conditions under which casting is required to work; heat treatment.

Temperature Fluctuations. Temperature Fluctuations and Heat Absorption of Internal-Combustion-Engine Pistons (Temperaturschwankungen und Wärmeaufnahme der Kolben von Verbrennungsmaschinen), Max Jakob. Zeit. des Vereines deutscher Ingenieure, vol. 66, nos. 51–52, Dec. 23, 1922, pp. 1138–1140, 1 fig. Points out that piston is almost entirely unaffected by change of temperature in combustion chamber of a gas engine; differences in

Sheets, Hard Rubber
Goodrich, B. F. Rubber Co.
Sheets, Rubber
Goodrich, B. F. Rubber Co.
Shelving, Metal
Manufacturing Equipment & Engrg. Co.
Siphons (Steam-Jet)
* Schutte & Koerting Co.
Sirens
(See Whistles, Steam)
Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.
Slitting Machines
* Bliss, E. W. Co.
Sluice Gates
(See Gates, Sluice)
Smoke Recorders
* Sarco Co. (Inc.)
Smoke Stacks and Flues
(See Stacks, Steel)
Sockets, Wire Rope
(See Wire Rope Fastenings)
Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n
Special Machinery
Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
Lammert & Mann Co.
Mackintosh-Hemphill Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.
Speed Reducing Transmissions
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Poole Engrg. & Mch. Co.
Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
Spray Nozzles
(See Nozzles, Spray)
Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
Sprockets
Baldwin Chain & Mfg. Co.
* Fuller-Lehigh Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.
Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.
Standpipes, Concrete
Heine Chimney Co.
Steam Engines, Separators, Superheaters, Traps, Turbines, etc.
(See Engines, Separators, Superheaters, Traps, Turbines, etc., Steam)
Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)
Steel, Alloy
* Union Drawn Steel Co.
Steel, Bright Finished
* Union Drawn Steel Co.
Steel, Cold Drawn
* Union Drawn Steel Co.
Steel, Cold Rolled
* Union Drawn Steel Co.
Cumberland Steel Co.
Steel, Nickel
* Union Drawn Steel Co.
Steel, Open-Hearth
* Union Drawn Steel Co.
Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Keeler, E. Co.
* Titusville Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
Steel, Rock Drill
* Ingersoll-Rand Co.
Steel, Screw, Cold Drawn
* Union Drawn Steel Co.
Steel, Strip (Cold Rolled)
Driver-Harris Co.
Steel, Vanadium
* Union Drawn Steel Co.
Steering Engines
(See Engines, Steering)
Stills
* Vogt, Henry Machine Co.
Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)
Stokers, Chain Grate
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
Green Engineering Co.
Stokers, Hand Operated
* McClave Brooks Co.
Stokers, Overfeed
* Detroit Stoker Co.
* McClave Brooks Co.
* Murphy Iron Works
Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.
Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Strainers, Steam
* Kieley & Mueller (Inc.)
Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.
Strainers, Water (Traveling)
Link-Belt Co.
Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.
Sugar Machinery
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.
Superheaters, Steam
* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.
Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.
Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.
Switchboards
* General Electric Co.
Switches, Electric
* General Electric Co.
Synchroscopes
Weston Electrical Instrument Co.
Synchronous Converters
(See Converters, Synchronous)

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Tachometers
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.
Tachoscopes
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Tackle Blocks
(See Blocks, Tackle)
Tank Work
* Graver Corp'n
Tank Work (Air, Gas, Oil, Water)
* Bigelow Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
Union Iron Works
* Walsh & Weidner Boiler Co.
Tanks, Acid
* Graver Corp'n
* Walsh & Weidner Boiler Co.
Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n
Tanks, Oil
* Graver Corp'n
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
Tanks, Steel
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.
Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Scaife, Wm. B. & Sons Co.
Tap Extensions
Allen Mfg. Co.
Tapping Attachments
* Whitney Mfg. Co.
Temperature Regulators
(See Regulators, Temperature)
Testing Laboratories, Cement
* Smidth, F. L. & Co.
Textile Machinery
* Franklin Machine Co.
Thermometers
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
Thermometers, Distance
Taylor Instrument Cos.
Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.
Thermostats
* Bristol Co.
* Fulton Co.
* General Electric Co.
* Powers Regulator Co.
Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)
Threading Machines, Pipe
* Landis Machine Co. (Inc.)
Tie Tamping Outfits
* Ingersoll-Rand Co.
Time Controllers
(See Regulators, Time)
Time Recorders
* Bristol Co.
Tipples, Steel
Link-Belt Co.
Tongs, Crane
Kenworthy, Chas. F. (Inc.)
Tools, Brass-Working Machine
* Warner & Swasey Co.
Tools, Machinists' Small
* Atlas Ball Co.
Tools, Pneumatic
* Ingersoll-Rand Co.
Tools, Special
DuPont Engineering Co.
Torches, Hand
* Best, W. N. Furnace & Burner Corp'n
Track, Industrial
Northern Engineering Works
Tractors
* Allis-Chalmers Mfg. Co.
Tractors, Turntable
Whiting Corp'n
Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Electric Crane & Hoist Co.
Whiting Corp'n
Tramways, Bridge
Link-Belt Co.
Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.
Transfer Tables
Whiting Corp'n
Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.
Transmission Machinery
(See Power Transmission Machinery)
Transmissions, Automobile
* Foote Bros. Gear & Machine Co.
Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)
Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)
Traps, Steam
* American Blower Co.
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
Traps, Vacuum
* American Blower Co.
* Crane Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Treads, Stair (Rubber)
United States Rubber Co.
Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n
Trolleys, Monorail
Whiting Corp'n
Tube Cleaners, Boiler
* Johns-Manville (Inc.)
Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.
Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.
Tubes, Pitot
Bacharach Industrial Instrument Co.
Tubing, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.
Tubing, Rubber (Hard)
Goodrich, B. F. Rubber Co.
Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mch. Co.
Whiting Corp'n
Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy. Corp'n
Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
Turbo-Blowers
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Turbo-Compressors
* Ingersoll-Rand Co.

heat absorption of pistons of different metals due to their varying reaction against radiating heat. Recommendations for further investigation of exchange of heat in cylinder.

PLANERS

Hydraulic Drive. Hydraulic Planer Drive, M. H. Sabine. Machy. (Lond.), vol. 21, no. 537, Jan. 11, 1923, pp. 460–463, 3 figs. Experimental hydraulic drive applied to large planer by Variable Speed Gears, Ltd., employing transmission gear of their separated unit type.

POWER

Progress 1922. Power Progress During 1922, F. J. Crolius. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 104–109, 4 figs. Sustained interest in pulverized firing; motor drives permit consolidation of large generating units.

PRESSES

Knuckle-Joint Embossing. Knuckle-Joint Embossing Presses, N. T. Thurston. Machy. (N. Y.), vol. 29, no. 6, Feb. 1923, pp. 451–452, 2 figs. Used extensively for embossing coins, medallions, etc. Describes 2500-ton double-geared press in operation on frame connection of automobile.

PRESSWORK

Tools. Lowering Operating Costs in the Press Department, C. E. Stevens. Am. Mach., vol. 58, no. 4, Jan. 25, 1923, pp. 143–146, 12 figs. Reducing number of operations; press tools used to facilitate operations and lower costs.

PRODUCER GAS

Low-Temperature. Low-Temperature By-Product Producer Gas. Gas Jl., vol. 161, no. 3114, Jan. 17, 1923, pp. 141–142. Distinctive features; semi-low and true low-temperature producers; comparison of producers.

PULLEYS

Calculation. Calculation of Pulleys for Fiber and Wire Rope (Berechnung von Hanfseil- und Drahtseilscheiben). Zeit. für die gesamte Giessereipraxis, Vol. 43, no. 50–51, Dec. 30, 1922, pp. 640–641, 9 figs. Number and diameter of ropes, horsepower to be transmitted, number of revolutions, diameter of pulleys.

PULVERIZED COAL

Boiler Firing. Firing Boilers with Powdered Fuel at Bruay Colliery, M. Sohm. Colliery Guardian, vol. 124, no. 3235, Dec. 29, 1922, pp. 1583–1585, 4 figs. Experiences with pulverized-coal plant for battery of 16 boilers installed at Labuissière central station. (Abstract.) Translated from Revue de l'Industrie Minérale.

Feeding, Principles of. Principles of Feeding Pulverized Fuel, M. W. Arrowood. Combustion, vol. 8, no. 2, Feb. 1923, pp. 117–122. Continuation of author's reply to those who commented on his articles in July, Aug. and Sept. 1922 issues.

PUMPING PLANTS

Water Wheels, 250-Year Old. 250-Year Old Marly Waterwheels for Versailles Fountains. Eng. News-Rec., vol. 90, no. 3, Jan. 18, 1923, p. 107, 2 figs. Water pumped to aqueduct 4000 ft. away, 500 ft. higher; gravity fall to fountains; 200 pumps, 15 mi. of cast-iron pipe.

PUMPING STATIONS

Design. An Economical Water Supply Plant, William C. Rudd. Ry. Maintenance Engr., vol. 19, no. 1, Jan. 1923, pp. 17–18, 6 figs. Wide range of water levels in river introduces interesting problem in pumping station design.

PUMPS

Air-Lift. Air Lift for De-Watering Mines, Herbert Axford. Compressed Air Mag., vol. 27, no. 11, Nov. 1922, pp. 312–314, 5 figs. Use of large capacity air compressors, up to 2000 and 3000 ft. displacement, for pumping water in anthracite coal mines.

Boiler-Feed. Boiler-Feed Pumps. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 100–112, 27 figs. Inspecting water valves; setting of Duplex pump valves; size of pump and injector, horsepower and pressures obtained in pumps.

Vacuum. Size Selection of Dry-Vacuum Pumps, Edward W. Noyes and Harold V. Sturtevant. Mech. Eng., vol. 45, no. 2, Feb. 1923, pp. 103–104, 3 figs. Methods of determining volumetric efficiency were tried out, and working with actual test data, values were obtained from which a "constant" curve was plotted, giving closely accurate results from 80-per cent perfect vacuum up; with aid of this curve two charts have been plotted, by means of which it is possible to determine rapidly (1) size of pump required to exhaust given volume to specified degree of vacuum in predetermined time; or (2) where vacuum pump is already installed, time required to exhaust given volume to specified degree of vacuum. (Apridged.)

R

RAILWAY CONSTRUCTION

Bolivia. Atocha-Villazon Railway Under Construction in Bolivia, Paul C. Campbell. Ry. Rev., vol. 72, no. 6, Feb. 10, 1923, pp. 243–245, 9 figs. Details of contracts and engineering characteristics of trans-Andean line, which will supply link connecting interior South American country with east coast; construction will span gap of 198 km.

RAILWAY ELECTRIFICATION

Advantages. Advantages of Railroad Electrification, R. J. O'Brien. Universal Engr., vol. 36, no. 6, Dec. 1922, pp. 17–24, 8 figs. Comparative methods of operation with steam and electric traction; trunk-line and terminal tunnel electrifications.

Developments. Notes on Railroad Electrification, E. A. Palmer. Jl. Pac. Ry. Club—Proc., vol. 6, no. 8, Nov. 1922, pp. 4–10. Developments in United States; electric-locomotive features based on types and operations on existing electrifications.

France. Electrification of the Midi Railway (L'Electrification des chemins de fer du Midi), M. Bachellery. Houille Blanche, vol. 21, nos. 71–72, Nov.–Dec. 1922, pp. 192–198. Developments since 1902; choice of current; power-house data; transformers and substations; line protection; etc.

RAILWAY MOTOR CARS

Diesel-Electric. New Railway Motor Car (Une nouvelle automotrice), P. Ostertag. Bul. Technique de la Suisse Romande, vol. 49, no. 2, Jan. 20, 1923, pp. 21–26, 9 figs. Describes Sulzer-Diesel car for light trains; 200 hp. at 440 r.p.m.; 70 km.p.h.; results of tests made on Wallisellen-Romanshorn line. See also Génie Civil, vol. 81, no. 27, Dec. 30, 1922, pp. 602–607, 11 figs.

REFRACTORIES

Air Furnaces. Refractories for Air Furnaces, C. E. Bales. Foundry, vol. 51, no. 3, Feb. 1, 1923, pp. 112–116, 2 figs. Manufacturing of molded and dry-pressed brick is described with details of different kinds of clays used; composition and sizes of brick for various parts of furnace. Paper prepared for Am. Foundrymen's Assn.

Defects in. Defective Refractory Materials, Alfred B. Searle. Gas Engr., vol. 38, no. 560, Dec. 15, 1922, pp. 330–335. Discusses after-expansion, blisters, blotches of color, blowholes, cores, cracks, discoloration, expansion, frozen refractories, fusibility, irregularity in size and shape, over-firing, permeability, porosity, refractoriness, scum, and other defects, and their causes.

Developments. Recent Developments in Refractories, Robert F. Ferguson. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 79–80. Review of progress made.

Refractories. Am. Ceramic Soc.—Jl., vol. 6, no. 1, Jan. 1923, pp. 275–306. Contains articles by different authors on fireclay, chrome, dolomite, magnesite, silica, high-alumina, fused-alumina, zirconia, zinc and silicon-carbide refractories; testing refractories.

Fireclay. Fire-clay Refractories for the Steel Industry, Chas. L. T. Edwards. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 100–102. Value of scientific methods and relation of impurities to melting points; high heat-resisting clays said to be very scarce.

Heat, Effect of. Effect of Heat on Kaolins, Clays, Etc. (Action de la chaleur sur les kaolins, les argiles, etc.), A. Bigot. Academie des Sciences—Comptes Rendus des Seances, vol. 176, no. 2, Jan. 8, 1923, pp. 91–93. Results of experiments with compressed and uncompressed samples to study effect of temperature.

Manufacture, Dry-Press Method. Dry Pressing Refractory Shapes, L. W. Flood. Brick & Clay Rec., vol. 61, no. 12, Dec. 12, 1922, pp. 865–866 and 897. Problems met with in manufacture of refractory ware by dry-press process, and advantages of method.

REFRIGERANTS

Sulphur Dioxide. On the Structure of the Sulphur Dioxide Molecule, A. O. Rankine. Physical Soc. of Lond.—Proc., vol. 35, Part 1, Dec. 15, 1922, pp. 33–38, 2 figs. Arrangement of atoms in molecule of gaseous sulphur dioxide and manner in which they are linked together.

REFRIGERATING PLANTS

Electric Drive. Electricity in Refrigerating Plants, H. L. Semans. Ice & Refrigeration, vol. 63, no. 6, Dec. 1922, pp. 329–331. Discusses contracts, costs, and relation that contract terms and conditions bear to operation and cost. Paper read before Nat. Assn. Practical Refrig. Engrs.

Kansas City. Kansas City Plant Model of Refrigeration Methods. Power Plant Eng., vol. 27, no. 4, Feb. 15, 1923, pp. 209–215, 6 figs. Cold Storage & Warehouse Co. has new plant which shows latest practice in ice-making and refrigeration work.

Measuring Instruments. Measuring Devices for Refrigerating Plants, John E. Starr. Ice & Refrigeration, vol. 63, no. 6, Dec. 1922, pp. 331–333. Discusses instruments used in analyzing operation of refrigerating machine. Paper read before Nat. Assn. Practical Refrig. Engrs.

REFRIGERATION

Fountain and Absorber System. The Fountain and Absorber System, John E. Starr. Ice & Refrigeration, vol. 64, no. 2, Feb. 1923, pp. 128–130. Operation of system; heat quantities involved; cost of recovery of ammonia; distilling apparatus; operating conditions.

REGULATORS

Arca. The Arca Regulators. Engineering, vol. 115, no. 2980, Feb. 9, 1923, pp. 167–170, 17 figs. Describes purely mechanical appliance, which, among other uses, has been applied for controlling steam, air and water pressures, temperature, humidity, voltage, speed, density of liquids, adjustment of electrodes of electric furnaces and regulation of flow of pulp in paper manufacture.

ROLLING MILLS

Adjustable-Speed Motors. Adjustable Speed Motors for Rolling Mills, J. D. Wright. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 89–91, 4 figs. D.c. motors still predominate regardless of higher cost and lower efficiency than a.c. systems.

Charcoal Iron. Charcoal Iron Sheets Once More. Sheet Metal Worker, vol. 13, no. 25, Jan. 5, 1923, pp. 845–848 and 879. How they are being made in rebuilt Griffith mill at Washington, Pa.

Chilled Rolls. Chilled Roll Making for Sheet Mills, W. H. Melaney. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 86–87, 3 figs. Proposed explanation of breakage of rolls.

Cold Rolling. Improving the Surface of Steel by Cold Rolling, J. H. McElhinney. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 91–92. Demand for cold-rolled steels increasing rapidly; describes process.

Electrically Driven. New Motor-Driven Rolling Mill in the Chicago District, H. E. Davis. Blast Furnace & Steel Plant, vol. 11, no. 2, Feb. 1923, pp. 164–165, 3 figs. Current purchased from superpower system; producer gas used in heating furnaces.

Production Control. Production Control in Non-ferrous Rolling-Mills, William R. Grunow. Management Eng., vol. 4, no. 2, Feb. 1923, pp. 125–130, 3 figs. Method of routing orders and keeping in close touch with progress of work.

Roll Grinding. Roll Grinding Shows Economy, S. S. Shoemaker. Abrasive Industry, vol. 3, no. 12, Dec. 1922, pp. 357–360, 4 figs. Varieties of rolling mills and types of rolls used for producing various kinds of material; describes grinder designed for finishing steel-mill rolls, and its operation.

S

SAND, MOLDING

Testing. Plans Test to Define Sands—2, R. J. Doty Foundry, vol. 51, no. 2, Jan. 15, 1923, pp. 53–57, 4 figs. Trials with bars to determine transverse strength indicating size of bar as well as method of ramming sand and introducing it into mold.

SCREW THREADS

Cutting Tools. Profile and Working Process of Inclined Screw-Cutting Tools (Profil und Wirkungsweise des schraggestellten Gewindeschneidstahls), J. Fritzen. Werkstattstechnik, vol. 16, no. 23, Dec. 1, 1922, pp. 701–706, 29 figs. Numerical and graphical determination of widths of inclined screw-cutting tool for square and trapezoidal threads; advantages and disadvantages of inclined position.

SEAPLANES

Double-Pontoon Monoplane. The L. F. G.-Seaplane (Das L. F. G.-Schiffsflugzeug), G. Reinhardt. Motorwagen, vol. 25, no. 36, Dec. 31, 1922, pp. 689–690, 3 figs. Characteristics of L. F. G.-V 19, a double-pontoon strutless monoplane: Length, 6.6 m.; span, 9.56 m.; height, 2.8 m.; weight, 610–695 kg.; speed 170 km. per hr.

Transport Service. Foreign Air Transport by Seaplane, Ladislas d'Orcy. Aviation, vol. 14, no. 5, Jan. 29, 1923, pp. 122–125, 7 figs. European and African services; the SCADTA (Sociedad Colombo-Alemana de Transportes Aereos) founded for purpose of operating air service between Atlantic coast and Bogotá, Columbia; the Liore & Olivier flying boat H13.

SEMI-DIESEL ENGINES

Exhaust Piping. Exhaust Piping for Semi-Diesel Engines, H. F. Shepherd. Power, vol. 57, no. 4, Jan. 23, 1923, pp. 134–136, 12 figs. Effect of exhaust pressure on cylinder scavenging; advantages of regulated pressures; influences of pipe length on fuel consumption.

Wygodsky Crude-Oil. How the Wygodsky Oil Engine Operates. Power Plant Eng., vol. 27, no. 3, Feb. 1, 1923, pp. 169–171, 6 figs. Airless atomizer, ignition element, fuel-oil torch, air-foot pump and flywheel locking used for starting.

SPRINGS

Helical. Conical and Parabolic Helical Springs (Ressorts en helice conique et parabolique), C. Reynal. Arts et Metiers, vol. 75, no. 26, Nov. 1922, pp. 343–352, 10 figs. Design and construction of some special springs, strength, flexibility, deformation under load, etc.

Notes on Helical Springs, Thomas Edward Green. Beama, vol. 12, no. 57, Jan. 1923, pp. 37–38, 3 figs. Formulas for torsional stress in springs.

STANDARDIZATION

Industrial. Industrial Standardization (Industriell Standardisering), Amos Kruse. Teknisk Tidskrift, vol. 53, no. 4, Jan. 27, 1922, pp. 25–28. Development of idea of standardization due to industrial progress; organization work for standards in individual states; universal standardization.

STANDARDS

German N. D. I. Report. Report of the German Industrial Standards Committee (Normenausschuss der Deutschen Industrie) Maschinenbau, vol. 2, no. 6, Dec. 16, 1922, pp. N27–N33, 14 figs. List of newly published standard sheets. Proposals of the Board of Directors for spiral, metal, and swivel drills, hand wheels, file handles, and edge screws.

STEAM ACCUMULATORS

Types. Heat Accumulation (Die Wärmespeicherung in der Dampfwirtschaft), Clemens Kiesselbach.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.

Turbo-Pumps
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

Turntables
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Underfeed Stokers
(See Stokers, Underfeed)

Unions
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Unloaders, Car
Link-Belt Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Goetze Gasket & Packing Co.
Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
United States Rubber Co.

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Fulton Co.
* Jenkins Bros.
* Simplex Valve & Meter Co.
* Smith, H. B. Co.

Valves, Air, Relief
* Fulton Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Altitude
* Simplex Valve & Meter Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* Davis, G. M. Regulator Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
* Crane Co.
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Blow-off
* Ashton Valve Co.
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
Elliott Co.
* Jenkins Bros.
* Lunkenheimer Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Butterfly
* Chapman Valve Mfg. Co.
* Crane Co.
* Lunkenheimer Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Valves, Check
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Electrically Operated
* Chapman Valve Mfg. Co.
* Dean, Payne (Ltd.)
* General Electric Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Exhaust Relief
* Crane Co.
* Davis, G. M. Regulator Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engineering Co.

Valves, Float
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Simplex Valve & Meter Co.

Valves, Foot
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Worthington Pump & Machy. Corp'n

Valves, Gate
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Vogt, Henry Machine Co.

Valves, Hose
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Hydraulic
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Hydraulic Operating
* Chapman Valve Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Davis, G. M. Regulator Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Plug
* Chapman Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
United States Rubber Co.

Valves, Radiator
* American Radiator Co.
* Crane Co.
* Dean, Payne (Ltd.)
* Fulton Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Radiator, Packless
* American Radiator Co.
* Fulton Co.

Valves, Reducing
* Davis, G. M. Regulator Co.
Elliott Co.
* Fulton Co.
* Kieley & Mueller (Inc.)

Valves, Regulating
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co
* Simplex Valve & Meter Co

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Stop & Check
(See Valves, Non-Return)

Valves, Superheated Steam (Steel.)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Thermostatically Operated
* Dean, Payne (Ltd.)
* Fulton Co.

Valves, Throttle
* Crane Co.
* Hooven, Owens, Rentschler Co.
* Jenkins Bros.
* Lunkenheimer Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Ventilating Systems
* American Blower Co.
Clarage Fan Co.

Voltmeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co

Vulcanizers
* Bigelow Co

Wash Bowls
Manufacturing Equipment & Engrg. Co.

Washers, Rubber
Goodrich, B. F. Rubber Co.
United States Rubber Co.

Water Cinder Mills
(See Mills, Cinder, Water)

Water Circulators, Filters, Gages, Heaters, Meters, Strainers, etc.
(See Circulators, Filters, Gages, Heaters, Meters, Strainers, etc., Water)

Water Columns
* Ashton Valve Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Water Purifying Plants
* Graver Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.
Wayne Tank & Pump Co.

Water Tube Boilers
(See Boilers, Water Tube)

Water Wheels
(See Turbines, Hydraulic)

Waterbacks, Furnace
Green Engineering Co.

Waterproofing Materials
* Johns-Manville (Inc.)
Texas Co.

Wattmeters
* Bristol Co.
* General Electric Co.
Weston Electrical Instrument Co.

Welding and Cutting Work
Linde Air Products Co.

Welding Equipment, Electric
* General Electric Co.

Wheels, Car
* Fuller-Lehigh Co.

Wheels, Polishing Paper
Rockwood Mfg. Co.

Whistles, Steam
* Ashton Valve Co.
Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Winches
* Brown Hoisting Machinery Co
Lidgerwood Mfg. Co.

Wire, All Metals
Driver-Harris Co.

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Flat
* Roebling's, John A. Sons Co.

Wire, Iron and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* General Electric Co.
* Roebling's, John A. Sons Co.
United States Rubber Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

Worm Gear Drives
* Foote Bros. Gear & Mach. Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A., Fdy. & Mach. Co.

Wrenches
*Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A. S. M. E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Zeit. des Internationalen Vereines der Bohringenieure u. Bohrtechniker, vol. 31, no. 1, Jan. 1, 1923, pp. 1–4 (Chemiker- u. Techniker-Zeitung). Discusses steam accumulators and their use in equalizing pressure and supply, especially in mining and metallurgical works.

STEAM ENGINES

Slide Valve. The Action of the D Slide Valve. Power, vol. 57, no. 8, Feb. 20, 1923, pp. 296–298, 5 figs. Explanation of effect of lap, lead and angle of advance; simple diagrams showing how valve action may be studied graphically.

Uniflow. Principle of the Una-Flow Steam Engine, L. T. Rutledge. Power House, vol. 16, no. 1, Jan. 5, 1923, pp. 21–23, 2 figs. Theoretical advantage of uniflow compared with counterflow engine; features in design upon which economy depends; its increasing popularity in pumping and rolling-mill engines.

STEAM POWER PLANTS

Gorgas, Ala. Salvaging a War Contract, R. D. Coombs. Elec. World, vol. 81, no. 6, Feb. 10, 1923, pp. 327–329, 3 figs. How Gorgas steam station, erected by government on Warrior River in Alabama, has continued to function and serve interconnected network and industries of Southeast with power.

Hotel. Power Equipment of the Empire's Largest Hotel, J. G. Soucy. Power House, vol. 16, no. 2, Jan. 20, 1922, pp. 21–32, 33 figs. Describes power plant and equipment, coal handling and boiler-room equipment, forced-draft system, steam and hot-water distribution, electrical equipment, heating and ventilation, ice making and refrigeration, of Mount Royal Hotel, Montreal.

STEAM TURBINES

Electric Drive for Auxiliaries. Electric Drive for Turbine Auxiliaries, John M. Drabelle. Gen. Elec. Rev., vol. 26, no. 1, Jan. 1923, pp. 52–54, 4 figs. Rating of electrically driven turbine auxiliaries in Iowa Ry. & Light Co., their automatic operating features.

Thyssen-Röder. Acceptance Test on a 5000-Kw. Thyssen-Röder Turbine (Abnahmeversuch an einer 5000-KW-Turbine, Bauart Thyssen-Röder), M. Schimpf. Gluckauf, vol. 58, no. 49, Dec. 9, 1922, pp. 1449–1451, 3 figs. Details of design of turbine and results of tests, which are presented in tabular form and compared with results from other turbines, previously tested.

Wheels. Construction of a Steam Turbine Wheel, John K. Cochran. Steam, vol. 31, no. 1, Jan. 1923, pp. 11–12, 6 figs. Consideration should be given to wheel with reference to effect upon it of speed and condensed steam which may enter wheel for one of several reasons, together with its rust-proof or non-corrosive qualities.

STEEL

Ingots, Heating Curves of. Heating and Cooling Curves of Large Ingots, F. E. Bash. Am. Inst. Min. & Met. Engrs.—Trans., no. 1201 S, Jan. 1923, 7 pp., 3 figs.; also (abstract) in Min. & Metallurgy, vol. 4, no. 193, Jan. 1923, p. 30, 1 fig. Results of test on ingot 45 in. in diam. to determine rate at which heat penetrated and length of time necessary to bring whole mass to forging heat; test showed difference in temperature between portions of interior as compared with temperature of furnace gases.

Physics of. Continued Discussion on the Physics of Steel, William R. Webster. Am. Inst. Min. & Met. Engrs.—Trans., no. 1205 S, Jan. 1923, 6 pp., 4 figs.; also (abstract) in Min. & Metallurgy, vol. 4, no. 193, Jan. 1923, pp. 30–31. Discusses estimated ultimate strength of pure iron, and increase in its strength by carbon, phosphorus, and manganese. Contains plots of curves coordinating effect of increments in carbon and manganese on tensile strength of basic open-hearth and acid bessemer steels.

Stainless, Bibliography. Bibliography of Stainless Steel and Iron, Victor S. Polansky. Forging & Heat Treating, vol. 8, no. 12, Dec. 1922, pp. 560–565. List of references to material in Carnegie Library of Pittsburgh.

STEEL CASTINGS

Carbon Determinations in. Prompt and Accurate Carbon Determinations, Thomas Hill. West. Machy. World, vol. 14, no. 1, Jan. 1923, pp. 1–2, 1 fig. Methods and apparatus found satisfactory under difficult steel-foundry conditions.

Heat Treatment. Successful Heat Treatment of Steel Castings, Walter H. White. Can Machy., vol. 29, no. 4, Jan. 25, 1923, pp. 18–19. Relieving strains set up by solidification; placing castings in furnace to avoid distortion; eliminating injurious gases.

X-Ray Examination. X-Ray Examination of Steel Castings, H. H. Lester. Chem. & Met. Eng., vol. 28, no. 6, Feb. 7, 1923, pp. 261–267, 12 figs. It is possible to locate 1/16-in. flaws in steel 3 in. thick with 30-min. exposure from commercial X-ray tubes; correspondingly smaller defects can be likewise revealed in thinner sections.

STEEL, HEAT TREATMENT OF

Drill Steel. Drill Steel—Its Forging and Heat Treatment, H. S. Brainerd. Compressed Air Mag., vol. 27, no. 11, Nov. 1922, pp. 303–311, 28 figs. Distinctive characteristics and composition of drill steel, and how it should be handled in blacksmith shop when being forged, sharpened, etc.

Hardness and Heat Treatment of Mining Drill Steel Shanks, Charles V. Clayton. Am. Inst. Min. & Met. Engrs.—Trans., no. 1208–M, Jan. 1923, 12 pp., 1 fig.; also (abstract) in Min. & Metallurgy, vol. 4, no. 193, Jan. 1923, pp. 33–34. Hardness varies between 196 and 782 Brinell; methods of heat treating vary not only between different mines, but also between different blacksmiths at same property; length of shank treated varies between 1/2 and 8 in. Results of investigation show that standard method of heat treating must be adopted by each shop if drill shanks are to give satisfactory service.

Review of Present Status of Drill Steel Breakage and Heat Treatment, Francis B. Foley, Charles V. Clayton and Henry S. Burnholz. Am. Inst. Min. & Met. Engrs.—Trans., no. 1206–M, Jan. 1923, 18 pp., 1 fig.; also (abstract) in Min. & Metallurgy, vol. 4, no. 193, Jan. 1923, pp. 28–29. Investigations are suggested, based on general survey of 60 mines west of Mississippi River.

Fatigue Strength, Effect on. Heat Treatment and the Strength of Steel Under Repeated Stresses, J. W. Harsch. Forging & Heat Treating, vol. 9, no. 1, Jan. 1923, pp. 57–62, 4 figs. Discusses effect of heat treatment on fatigue strength of steel; machines and methods; influence of structure on fatigue-resisting properties. Results of investigations at University of Ill.

Superheating. Heat Treating and Superheating (Les traitements thermiques et la surchauffe), J. Hebert. Technique Moderne, vol. 14, nos. 12 and 14, Nov. 15 and Dec. 15, 1922, pp. 481–485 and 600–607, 19 figs. Control of effects of heat treatment and utilization of diagrams; superheating from physical, mechanical and metallographic standpoints; changes produced in superheated steels by heat treatment. Bibliography.

STEEL MANUFACTURE

Neutral Process. The "Neutral" Steel Process in Rail Manufacture, Cecil J. Allen. Ry. Engr., vol. 44, no. 516, Jan. 1923, pp. 7–9, 1 fig. New process of steel manufacture in which "neutral" open-hearth furnace lining allows of production of steel of closely approaching acid quality from combination of hematite and low phosphoric iron.

STEEL WORKS

Electric Drive. Electric Power Application in the Steel Mills, G. E. Stoltz. Blast Furnace & Steel Plant, vol. 11, no. 2, Feb. 1923, pp. 159–160, 2 figs. Motor-driven rolling mills have proven more economical than steam-driven during recent depression; turbo-generators of 10,000 kw. find general acceptance in larger plants.

Fuel Gas in. Fuel Gas Question in Steel Industry, F. J. Denk. Iron Age, vol. 111, no. 6, Feb. 8, 1923, pp. 401–405, 6 figs. Dependence cannot be placed on B.t.u. values in comparing fuels; pyrometric efficiencies and flame temperatures important.

Hot-Metal Cars. Mixer Type Hot Metal Cars. Iron Age, vol. 111, no. 5, Feb. 1, 1923, p. 353, 2 figs. Absence of skulls, low cost of maintenance and preliminary mixing are features of cars developed under Pugh patents by M. H. Treadwell Co.

Portsmouth, Ohio. River Transportation Featured in Ohio Steel Plant, F. J. Crolius. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 70–82, 18 figs. Describes steel plant where raw materials are converted into steel barrels, wire, nails and variety of special products.

STOKERS

Marine Boiler. Mechanical Stoking at Sea. Engineer, vol. 135, no. 3498, Jan. 12, 1923, pp. 46–47, 2 figs. Results of test carried out to determine efficiency of mechanical underfeed stoker fitted to Babcock & Wilson marine boiler on Dutch steamer, Parigi.

Mechanical. Mechanical Stokers. Southern Engr., vol. 38, no. 5, Jan. 1923, pp. 86–92, 13 figs. Details of design and operation of chain-grate, overfeed, and underfeed stokers.

Mechanical Stoking on Merchant Ships. Mar. Engr. & Naval Architect, vol. 46, no. 544, Jan. 1923, pp. 8–11, 7 figs. Description and application of underfeed "type E" mechanical stoker, which has been adopted with great success by Dutch Koninklijke Paketvaart Maatschappy, of Amsterdam, on two of their vessels, SS. Bintoehanv and SS. Parigi.

Selection. Geographical Location—Factor in Choice of Stoker, J. F. Springer. Combustion, vol. 8, no. 2, Feb. 1923, pp. 109–111 and 113. Economies of mechanical stokers; importance of location; fields of stoker application; discusses different classes of stokers.

STRESSES

Micro Recorder. The Cambridge Micro-Stress Recorder. Engineering, vol. 115, no. 2977, Jan. 19, 1923, p. 87, 2 figs. Recorder constructed by Cambridge & Paul Instrument Co., London, will measure and record varying stresses such as stresses arising in bridges when trains are crossing at various speeds.

T

TAPER PINS

Standardization. Can Taper—Pin Practice Be Standardized? Am. Mach., vol. 58, no. 7, Feb. 15, 1923, pp. 255–256, 5 figs. Problems in connection with standardization.

TESTING MACHINES

Rockwell Hardness. The Rockwell Hardness Tester. Machy. (Lond.), vol. 21, no. 539, Jan. 25, 1923, pp. 535–536, 2 figs. Comparison of Rockwell with Brinell and scleroscope methods; description of machine.

TEXTILE MACHINERY

Warp Knitting Machines. Warp Knitting Machines, Edward Murden. Textile World, vol. 63, no. 3, Jan. 20, 1923, pp. 51 and 53, 7 figs. Origin and development.

TEXTILE MILLS

Cotton Mills, Waste in. Waste in Cotton Manufacturing, Ralph E. Loper. Textile World, vol. 62, nos. 25 and 26, Dec. 16 and 23, 1922, pp. 37–39, and 41, 43 and 45. Avoidable losses in human energy, time, equipment, power, curtailment or low production, supplies and material; how waste and spoilage affect profits of mill.

TIME STUDY

Foundries. Time Study Means Progress, A. J. Kramer. Foundry, vol. 51, no. 2, Jan. 15, 1923, pp. 72–76, 7 figs. Discussion and amplification of six fundamental reasons for adoption of time-study system; workmen's cooperation needed; qualifications of time-study observer enumerated.

TOOLS

Design. Control of Tool Design, C. J. Dorer. Am. Mach., vol. 58, no. 7, Feb. 15, 1923, pp. 251–254, 8 figs. Standard instructions to draftsmen; sizes of drawings, part members, etc.; machinery, tool, pattern and alteration records.

Lathe. Lathe Tools. Engineering, vol. 115, no. 2979, Feb. 2, 1923, pp. 146–147, 1 fig. Results of experiments to determine durability of tools under various operating conditions, such as different cutting speeds, different tool angles, etc. Extracts of report issued by Lathe Tools Research Committee.

Lathe Tools Research. Engineering, vol. 115, no. 2979, Feb. 2, 1923, pp. 137–139, 7 figs. Résumé of report of Lathe Tools Research Committee; deals with heat treatment; tests to determine cutting capabilities; Brinell hardness tests; etc.

TRACTORS

Improving Efficiency. Roadless Vehicles. Motor Transport, vol. 35, no. 929, Dec. 18, 1922, pp. 793–794 and (discussion) 795. How efficiency of track-laying machine may be improved.

Manufacture. Safeguarding Quality in Manufacturing, Howard L. McLean. West. Machy. World, vol. 14, no. 1, Jan. 1923, pp. 8–9 and 17, 6 figs. Gages, fixtures and methods of inspection in tractor-manufacturing plant.

TRANSPORTATION

Steel Industry. Transportation in the Steel Industry From an Engineering Standpoint, F. L. Egan. Blast Furnace & Steel Plant, vol. 11, no. 1, Jan. 1923, pp. 11–14. Railway surveys unproductive; river transportation. Analysis of difficulties which have limited free development of transportation through and about Pittsburgh territory. Possibilities of near future.

TUBING

Welded Steel. Making Welded Steel Tubing, Edward K. Hammond. Machy. (N. Y.), vol. 29, no. 6, Feb. 1923, pp. 421–423, 8 figs. Rolling tubing; welding by electricity and oxy-acetylene process; finishing welded seam.

V

VALVES

Loss of Head in. Experiments on Loss of Head in Valves and Pipes of One-Half to Twelve Inches Diameter, Charles I. Corp and Roland O. Ruble. University of Wis.—Bul., Eng. Series, vol. 9, no. 1, 1922, 143 pp., 55 figs. Presents results of 2200 tests on 48 different gate and globe valves; and results of 425 tests to determine pipe friction. Loss of head due to gate valves was measured for various openings and fully open; and loss of head due to globe valves was determined under fully open conditions.

VENTILATION

Molding Shop. Ventilating a Moulding Shop, James Mackay. Domestic Eng., vol. 101, no. 6, Nov. 11, 1922, pp. 227–229, 3 figs. Ventilating and air-conditioning apparatus furnishing 6,000,000 cu. ft. of air per hr., installed in iron-foundry molding shop.

W

WASTE HEAT

Utilization. Conserving Waste Heat in the Making of Corn Syrup, Thomas Wilson. Power, vol. 57, no. 4, Jan. 23, 1923, pp. 122–127, 4 figs. All exhaust steam from power generation used in processes, while gases of combustion are used for drying; modern boiler plant using forced-draft chain-grate stokers; plant contains 2500-kw. direct connected steam-engine unit.

Utilization of Waste Heat in Factories, John B. C. Kershaw. Power House, vol. 16, no. 1, Jan. 5, 1923, pp. 24–28 and 30, 5 figs. Condensation of information published lately on waste-heat utilization, describing heat-saving appliances used in England, America, France and Germany.

WELDING

See AUTOGENOUS WELDING; ELECTRIC WELDING, ARC; OXY-ACETYLENE WELDING.

WOMEN WORKERS

Experience in Various Industries. Our Experience with Women Workers. Factory, vol. 29, no. 6, Dec. 1922, pp. 659–661, 692, 694, 696 and 698, 2 figs. Experience secured from manufacturers in 36 lines of industries. Why women's production has slumped since war; where women do better work than men; how costs of women labor compare with that of men.

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THE ENGINEERING INDEX

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THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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(See also page 332 of this issue for supplementary items.)

AERODYNAMICS

Vortex Theory. Application of the Vortex Theory to Aerodynamics of Sustaining Wings (Application de la theorie des tourbillons à l'aérodynamique des ailes sustentatrices), M. Toussaint. Aérophile, vol. 30, nos. 19-20, 21-22, 23-24, Oct. 1-15, Nov. 1-15, Dec. 1-15, 1922, and vol. 31, no. 1-2, Jan. 1-15, 1923, pp. 298-305, 326-331, 356-360 and 5-9, 41 figs. Mathematical treatment of theory and its application to wings of infinite and finite spread; theory of monoplane wings; theory of biplane, triplane and multiplane cells.

AERONAUTICAL INSTRUMENTS

Tension Meter. An Acoustic Tension Meter, A. H. Stuart. Roy. Aeronautical Soc.—Jl., vol. 27, no. 146, Feb. 1923, pp. 73-78, 6 figs. Describes instrument used with marked success for checking tensions in internal bracing wires of airplane wings and fuselages, and for other work.

AERONAUTICS

European Developments. Report of Inspection Trip to France, Italy, Germany, Holland, and England, Made During Winter of 1921-1922, William-Mitchell, Clayton Bissell and Alfred Verville. Air Service Information Circular, vol. 4, no. 391, Nov. 1, 1922, 206 pp. Résumé of French research, development, and service aircraft. Italian aeronautical activities. German research development in aircraft construction. Dutch air-service report on Fokker airplanes. British research development in service aircraft. Recommendations.

Investigations. Recent Aeronautic Investigations and the Airplane Industry, Joseph S. Ames. Franklin Inst.—Jl., vol. 195, no. 2, Feb. 1923, pp. 145-163, 15 figs. Distribution of air forces over airplane; motion of airplane in maneuvers; compressed air wind tunnel.

Nomenclature. Nomenclature for Aeronautics. Nat. Advisory Committee for Aeronautics, Report no. 157, 1923, 59 pp., 15 figs. Alphabetical nomenclature; nomenclature by divisions; aeronautical symbols.

Standardization. Aeronautical Standardization. Aviation, vol. 14, no. 10, Mar. 5, 1923, pp. 269-270. Practical suggestions for standardizing materials used in airplane construction.

AIRPLANE ENGINES

High-Compression, Fuels for. Testing Fuels for High-Compression Engines, Stephen M. Lee and Stanwood W. Sparrow. Soc. Automotive Engrs.—Jl., vol. 12, no. 1, Jan. 1923, pp. 11-16, 8 figs. Methods used and results obtained in two investigations made by Bur. of Standards relating to fuels for use in high-compression aircraft engines; fuels in question are benzol and ethyl alcohol, alone or blended with gasoline.

Rolls-Royce. The Rolls-Royce Eagle IX Aero Engine. Engineering, vol. 115, no. 2981, Feb. 16, 1923, pp. 212-214, 6 figs. partly on supp. plate. Details of design and construction.

AIRPLANE PROPELLERS

Speed Variation. Variation in the Number of Revolutions of Air Propellers, W. Achenbach. Nat. Advisory Committee for Aeronautics, Tech. Notes, no. 131, Mar. 1923, 7 pp. Gives simple formulas permitting advanced calculation to be made of variation of propeller speed with variation of one or more dimensions of propeller, and allowing necessary corrections to be applied. Translated from Technische Berichte, vol. 3, part 2.

Theories. Review of Airscrew Theories, A. R. Low. Roy. Aeronautical Soc.—Jl., vol. 27, no. 146, Feb. 1923, pp. 38-59 and (discussion) 60-72, 18 figs. Aerofoil analogy; flow around airscrew blades; Lanchester-Prandtl theory.

AIRPLANES

Amphibian. The Fokker Amphibian Airplane (Das Fokker-Wasser-Landflugzeug), Werner v. Langsdorff. Schiffbau, vol. 24, no. 20, Feb. 14, 1923, pp. 324-326, 2 figs. Flying boat with adjustable landing and land-flight arrangements; made of duralumin; span, 18.2 m.; length, 12 m.; height, 3.3 m.; weight empty, 800 kg.; load, 800 kg.; engine, 450-hp. Napier-"Lion;" speed, 200 km. per hr.

Longitudinal Damping. Note on the Interpretation of Wind Tunnel Experimental Data with Reference to the Longitudinal Damping Characteristics of an Airplane. Aerial Age, vol. 16, no. 3, Mar. 1923, pp. 137-139. Deals with application of stability theory (as developed by Bryan, Bairstow, and others) to data obtained by routine tests on model airplane.

Metal. The Design of Metal Airplanes, Roy G. Miller and F. E. Seiler, Jr. Aviation, vol. 14, no. 8, Feb. 19, 1923, pp. 210-214, 11 figs. Outstanding features of metal construction as illustrated by its principal exponents.

Military. Military-Airplane Development and Construction in Peacetime, F. H. Russell. Soc. Automotive Engrs.—Jl., vol. 12, no. 3, Mar. 1923, pp. 296-298. Suggestion is made that experimental work and subsequent developments be confined to same organization, with provision for production in large quantities in time of war.

Paris Show. Eighth International Aeronautical Exposition (La VIIIe Exposition internationale de l'Aéronautique), P. Demeuran. Technique Moderne, vol. 15, no. 2, Jan. 15, 1923, pp. 33-37, 8 figs. Analyzes principal developments made in construction of airplanes since 1921.

Specifications. American and Foreign Airplane Specifications. Automotive Industries, vol. 48, no. 8, Feb. 22, 1923, pp. 454-459. American, British, Dutch, French, German, Italian, Japanese, Czechoslovakian and Swiss specifications.

ALLOYS

Thermal Conductivity. Thermal Conducitivity of Some Industrial Alloys, H. M. Williams and V. W. Bihlman. Am. Inst. Min. & Met. Engrs.—Trans., no. 1229-N, Mar. 1923, 5 pp., 2 figs.; also (abstract) in Min. & Metallurgy, vol. 4, no. 195, Mar. 1923, p. 149. Apparatus for determination of thermal conductivity of metals with accuracy within 2 per cent; thermal conductivities of number of commercial alloys as determined with this apparatus, are given.

[See also BABBITT METALS; DURALUMIN; IRON ALLOYS; MAGNESIUM ALLOYS.]

ALUMINUM

Foundry Practice. Aluminium Foundry Practice, E. H. Tyson. Foundry Trade Jl., vol. 27, no. 339, Feb. 15, 1923, pp. 129-132, 10 figs. Discovery and use of aluminum; furnaces; molding machines; American practice; contraction; hand molding; blowholes, porosity and unsoundness.

ALUMINUM ALLOYS. See DURALUMIN.

AMMONIA

Saturated Vapor, Specific Volume of. Specific Volume of Saturated Ammonia Vapor, C. S. Cragoe, E. C. McKelvy and G. F. O'Connor. Refrig. Eng., vol. 9, no. 8, Feb. 1923, pp. 239-248, 4 figs. Specific volume of saturated ammonia vapor was measured in temperature interval —50 deg. to +50 deg. cent. by two methods; one involving direct determination of mass of vapor contained in known volume and other, an optical method, involving measurements of index of refraction of vapor.

AMMONIA COMPRESSORS

Oscillating. An Oscillating Ammonia Compressor, H. J. Macintire. Refrig. Eng., vol. 9, no. 8, Feb. 1923, pp. 252-253, 2 figs. Action of machine, advantages and objections.

APPRENTICES, TRAINING OF

Foundry Trades. Apprenticeship and the Foundry Trades, T. Makemson. Foundry Trade Jl., vol. 27, nos. 336 and 338, Jan. 25 and Feb. 8, 1923, pp. 71-73 and 117-118. Selection of apprentices; admission requirements; practical training; instruction and supervision; works schools; training schemes in operation; summary of selected training schemes; American and continental schemes.

AUTOMOBILE ENGINES

Air-Cooled. Aircraft-Engine Practice as Applied to Air-Cooled Passenger-Car Engines, S. D. Heron. Soc. Automotive Engrs.—Jl., vol. 12, no. 1, Jan. 1923, pp. 31-56, 37 figs. Wherein automobile designer and builder can profit by use of practice developed for air-cooled aircraft engines; cylinder design and performance; valve location and type of finning; form of cylinder-head; cylinder material; cooling surface; port arrangement for in-line engines; camshaft and valve-gear arrangement, temperature; exhaust-valve cooling; quantity of air; fans, pistons; etc. Foundry production of air-cooled engines.

American Specifications. American Stock Engine Specifications. Automotive Industries, vol. 48, no. 8, Feb. 22, 1923, pp. 428-431.

Carburetors. See CARBURETORS.

Developments. Recent Novelties in Engine Construction. Automotive Manufacturer, vol. 64, nos. 9 and 10, Dec. 1922 and Jan. 1923, pp. 21-24 and 10-12, 8 figs. Improved forms of cylinder construction and arrangement; new valve forms; modifying stroke to suit power demand; eliminating ignition; single-sleeve-valve engine.

Heavy-Oil vs. Gasoline. A Comparative Test. Autocar, vol. 50, no. 1426, Feb. 16, 1923, pp. 252-255, 4 figs. Details of comparative test of two Peugeot cars, identical, but one fitted with normal 4-stroke 4-cylinder engine of 2950 cu. cm., and other with Peugeot-Tartrais 2-stroke 2-cylinder engine of 2199 cu. cm., in efforts to develop type of car engine capable of consuming heavy oils.

Ignition. See IGNITION.

Radiators. Cooling Capacity of Automobile Radiators, E. H. Lockwood. Soc. Automotive Engrs.—Jl., vol. 2, no. 1, Jan. 1923, pp. 31-61, 5 figs. Method of computing cooling capacity of radiators under any reasonable operating conditions, based on coefficients determined by laboratory tests; experiments; formulas.

Small-Car. Development of Engines and Transmissions for Small Automobiles (Entwicklungsmöglichkeiten für Motoren und Antriebe der Kleinautos),

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Note.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 138

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Machy. Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air).

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Elec & Mfg. Co.
Weston Electrical Instrument Co.

Anchorages, Overhead Transmission
Midwest Steel & Supply Co.

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Babbit Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co.
and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdy. & Mach. Co.
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Machy. Co.

Blocks, Tackle
Clyde Iron Works Sales Co
* Roebling's, J. A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blowers, Steam (Ring Type)
* McClave-Brooks Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Baffles,
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Boiler Compounds
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.
Link-Belt Co.

Bridgewalls (Furnace)
McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.
Todd Shipyards Corp'n

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co.
and American Steam Gauge & Valve Mfg. Co. Division

Cars, Charging
Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

R. Conrad. Motor u. Auto, vol. 20, no. 3, Feb. 10, 1923, pp. 16–18. Five- and six-horsepower motors; air resistance; four-cylinder engines; high number of r.p.m.

AUTOMOBILE FUELS

Alcohol Mixtures. Alcohol Fuel Mixtures. H. R. Adam. Chem., Met. & Min. Soc. of S. Africa—Jl., vol. 23, no. 6, Dec. 1922, pp. 112–118, 3 figs. Examination of typical mixtures with some reference to economic conditions in S. Africa.

French National Automobile Fuel (Le Carburant National Obligatoire). Journal du Pétrole, vol. 22, no. 12, Dec. 1922, pp. 2–4. Text of proposed law, introducing from Apr. 1, 1923 compulsory use of denatured alcohol to the extent of 10 per cent by volume of fuel.

Alcohol and Benzol. Benzol and Alcohol as Automobile Fuels (El uso del benzol i del alcohol como combustible en los automoviles). O. Navarro. Sociedad de Fomento Fabril—Boletin, vol. 39, nos. 8 and 9, Aug. and Oct. 1922, pp. 487–497 and 634–641, 6 figs. Discusses motor fuels in various countries; gives table showing work done per liter of pure benzol, alcohol and various mixtures of the two; tables of test data with Mercedes motors and carburetors.

Catalytic Production. Industrial Catalysis of Petroleum Oils (La catalyse industrielle des huiles de petrole). Journal des Usines à Gaz, vol. 47, no. 2, Jan. 20, 1923, pp. 17–19. Cracking process for producing motor fuels from heavy oils; process of catalytic decomposition, including debenzolizing.

Volatility. Further Data on the Effective Volatility of Motor-Fuels, Robert E. Wilson and Danile P. Barnard. Soc. Automotive Engrs.—Jl., vol. 12, no. 3, Mar. 1923, pp. 287–292, 9 figs. Test results of 14 fuels; improvements made in manner of preparation of equilibrium solution and in apparatus used for measurement of vapor pressures; data on fuels; table showing comparison of more important properties of fuels.

Society's Research Sheds New Light on Fuel Problem. V. H. Gottschalk. Soc. Automotive Engrs.—Jl., vol. 12, no. 1, Jan. 1923, pp. 3–9, 4 figs. Describes series of road-service tests made of stock cars, by automotive and petroleum industries jointly, to determine effect of changes in fuel volatility on gasoline mileage for respective make of car, and best fuel as regards volatility.

[See also GASOLINE.]

AUTOMOBILES

American. American Passenger Car Chassis Design Shows Refinement of Detail. Automotive Industries, vol. 48, no. 8, Feb. 22, 1923, pp. 377–386, 12 figs. Six-cylinder models increase with corresponding decrease in fours; semi-floating type rear axle makes big gain; multiple-disk clutch leads over single-plate type; chain-driven camshafts in greater favor; number of different makes declines. Specifications of American chassis.

Austin. The Austin Seven. Auto-Motor Jl., vol. 28, no. 6, Feb. 8, 1923, pp. 109–112, 12 figs. Details of new small car now in production, designed to meet demand for vehicle of high grade, cheap in first cost and economical in use; 10½ b.hp. at 2400 r.p.m.

Axles. Torbensen Passenger Car Axles Have Numerous Refinements in Design. Automotive Industries, vol. 48, no. 9, Mar. 1, 1923, pp. 514–515, 3 figs. Rear axle is semi-floating banjo type with pressed-steel housing; Elliott-type front axle said to have dust-proof parts.

B. S. A., 12-Hp. The 12 Hp. B. S. A. Car. Auto-Motor Jl., vol. 28, no. 4, Jan. 25, 1923, pp. 131–133, 9 figs. Six-cylindered Knight sleeve-valve engine of monobloc construction; all-weather vehicle.

Calthorpe. The 10–15 Hp. Calthorpe. Auto-Motor Jl., vol. 28, no. 8, Feb. 22, 1923, pp. 153–155, 11 figs. Small car of high speed and low fuel consumption.

De Dion Bouton. Testing the 12–24-Hp. De Dion Bouton. Autocar, vol. 50, no. 1428, Mar. 2, 1923, pp. 342–343, 3 figs. Side-valve, two-liter engine; 5-seater; details of design, construction, and 80-mile test run.

Design. British Engineering Trends shown at Olympia Exhibit, M. W. Bourdon. Automotive Industries, vol. 47, no. 21, Nov. 23, 1922, pp. 1025–1032, 12 figs. Overhead valves, unit power plant, and aluminum pistons increase in popularity; more cars equipped with four speeds; aluminum axles; most new engines have less than 120-cu. in. piston displacement.

Headlights. A Double-Reflector Type of Head Lamp, Bruno Heymann. Soc. Automotive Engrs.—Jl., vol. 12, no. 1, Jan. 1923, pp. 100–104, 9 figs. Glare problem in Europe; describes new anti-glare head-lamp involving entirely new principle in light projection using two reflectors, a 6-in. paraboloid reflector with an oblique projecting reflector.

Hillman. The 11 Hp. Hillman Car. Auto-Motor Jl., vol. 28, no. 4, Jan. 25, 1923, pp. 67–70, 10 figs. Small car with all-weather body; capable of developing 25 hp. on brake at 2500 r.p.m.

Minerva. The 20 Hp. Six-Cylindered Minerva. Auto-Motor Jl., vol. 28, no. 9, Mar. 1, 1923, pp. 175–177, 9 figs. Four-five seater, capable of speeds exceeding 60 m.p.h., latest produce of Antwerp firm; normal gasoline consumption at rate of 20 m. to gal.

Ruston-Hornsby. The Latest Ruston-Hornsby Cars. Autocar, vol. 50, no. 1427, Feb. 23, 1923, pp. 312–314, 7 figs. Details of design and construction of 4-cylinder 16- and 20-hp. cars, identical save for cylinder bore; three-speed gear box, open propeller shaft, Hotchkiss final drive, and semi-elliptic springs.

Schneider. Test of the Th. Schneider. Autocar, vol. 50, no. 1427, Feb. 23, 1923, pp. 308–309, 3 figs. 15-hp. 4-cylinder French car; details of construction and test run.

Scottish Show. Transport Vehicles at the Scottish Show. Motor Transport, vol. 36, no. 935, Jan. 29, 1923, pp. 131–138, 13 figs. Brief description of passenger and goods-carrying machines (alphabetically arranged) on exhibition at Kelvin Hall, Glasgow. See also Motor Transport, vol. 36, no. 936, Feb. 5, 1923, pp. 169–174, 23 figs.

Stanley. Latest Stanley Chassis Incorporates Numerous Refinements, P. M. Heldt. Automotive Industries, vol. 48, no. 11, Mar. 15, 1923, pp. 617–622, 5 figs. Boiler capacity increased about 50 per cent; more powerful brakes are fitted; automatic control of water fed to boiler and fuel to burner.

Starting Motor. Remy Starter with Right Angle Drive Used on Copper Cooled Chevrolet. Automotive Industries, vol. 48, no. 10, Mar. 8, 1923, pp. 557–558, 4 figs. New type of gearing has teeth on face of flywheel instead of on rim, yet sides of teeth are not convergent as in bevel gearing.

Wheel Wobble. Correct Steering System Layout Prevents Wheel Wobble, Cornelius T. Myers. Automotive Industries, vol. 48, no. 10, Mar. 8, 1923, pp. 575–577, 7 figs. Slack brought on by wear one cause of wobbling; study of influence of unbalanced forces set up in front wheels.

AVIATION

Aerial Forest Patrol. Operations of the Aerial Forest Patrol, 1922. Aviation, vol. 14, no. 9, Feb. 26, 1923, pp. 241–244, 1 fig. Air Service report shows that aerial patrols offer unparalleled means for suppressing forest fires.

Aerial Transportation. The Position of Air Transport To-day, W. Sefton. Aeroplane, vol. 24, no. 6, Feb. 7, 1923, pp. 98, 100, 102 and 104. Subsidized services and unsubsidized undertakings during 1922; general résumé of British progress in Europe; general progress of air transport outside British Empire and in British overseas dominions; airships; relation between civil and military aviation.

The Story of Transportation by Air, J. C. Hunsaker. Aviation, vol. 14, no. 8, Feb. 19, 1923, pp. 215–218. Review of development and application of aircraft to purposes of transportation.

Civil. Air Transport, F. Handley Page. Inst. Transport—Jl., vol. 4, no. 4, Feb. 1923, pp. 126–134 and (discussion) 134–139, 1 fig. Development in civil aviation between England and Continent since its beginning in 1919, and actual results achieved; probable future developments.

Commercial. Immediate Possibilities of Commercial Airplane Service, C. G. Peterson. Soc. Automotive Engrs.—Jl., vol. 12, no. 3, Mar. 1923, pp. 263–264. How commercial airplanes can be used and what they will be used for; what Aerial Mail Service has demonstrated; estimate of equipping and operating night-flying line between New York City and Chicago.

European Air Lines. Impressions of European Air Lines, Grover Loening. Aviation, vol. 14, no. 9, Feb. 26, 1923, pp. 238–240, 9 figs. The men, machines, routes and flying, as seen by American observer.

B

BABBITT METALS

Character and Uses. Babbitt Metals—Their Character and Uses, L. D. Allen. Raw Material, vol. 6, no. 2, Feb. 1923, p. 56. Classifications of babbitt metals as to metals from which they are made and as to mechanical uses for which they are employed.

BEARING METALS

Calcium-Lead. Calcium-Lead Bearing Alloy, Leonid Filipoff. Metal Industry (Lond.), vol. 22, no. 7, Feb. 16, 1923, pp. 145–147, 3 figs. Advantages and disadvantages, particularly in respect to progress made in development of its uses in Continental railway work; metallographical and metallurgical examinations carried out by E. Pewoworsky, of Breslau.

BEARINGS

Babbitting. The Science of Babbitting Bearings. Elec. Ry. Jl., vol. 61, no. 8, Feb. 24, 1923, pp. 321–322, 5 figs. Methods of United Elec. Rys., formerly Rhode Island Co., in babbitting of journal and axle bearings.

Manufacture. Making Bearings by Unit System, Herbert R. Simonds. Iron Trade Rev., vol. 72, no. 11, Mar. 15, 1923, pp. 801–806, 9 figs. New one-floor-level plant at Plainville, Conn., of Standard Steel & Bearings Inc., Philadelphia; process described.

Research. Bearings, Bearing Metals and Lubrication (Neuere Untersuchungen uber Lager, Lagermetalle und Lagerschmierung), Erich Schulze and Vogt. Verkehrstechnik, vol. 39, nos. 48 and 49, Dec. 1 and 8, 1923, pp. 577–580 and 585–589, 16 figs. Mistakes in construction of bearings; rules for casting bearings; oils; load and temperature; bending strength of various alloys and tests carried out.

BEARINGS, BALL

Roller and. Ball and Roller Bearings. Times Trade & Eng. Supp., vol. 11, no. 237, Jan. 20, 1923, p. 21, 1 fig. Recent advances; fatigue effects; bearings for railway rolling stock and rolling mills.

BELT DRIVE

Types. Belt Drives (Flach- oder hochkanttreibriemen?), Walter. Werkstattstechnik, vol. 17, no. 2, Jan. 15, 1923, pp. 37–39, 8 figs. Leather belting; flat and zigzag compound glued leather strips; pulleys and diameters; width of belts; efficiency.

BENDING MACHINES

Plate. The Sedgwick Plate-Bending Machine. Engineering, vol. 115, no. 2984, Mar. 9, 1923, p. 300, 6 figs. partly on p. 301. Describes machine which will produce wide range of work of varying angles and corner radii without use of any change parts whatever; main feature is pair of rocking tables which fold upward and bend plate, which is held in position by upper beam.

BLAST FURNACES

Coke Combustion in. Combustion of Coke in Blast-Furnace Hearth, G. St. J. Perrott and S. P. Kinney. Am. Inst. Min. & Met. Engrs.—Trans., no. 1222-S, Mar. 1923, 43 pp., 14 figs.; also (abstract) in Min. & Metallurgy, vol. 4, no. 195, Mar. 1923, pp. 145–146, 1 fig. Combustion zone of number of blast furnaces, operating on cokes varying widely in physical characteristics, was explored by means of water-cooled gas sampling tubes driven into hearth through tuyeres; results show that combustion of coke by blast is complete 32 to 40 in. from tuyeres.

BLOWERS

Gas-Driven. Practical Tests on a Gas-Driven Blower (Betriebsversuche an einer Gasgebläsemaschine), Marcel Steffes. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 7, Feb. 17, 1923, pp. 151–153, 9 figs. Results of 4-day tests for determining, among other things, quality and heat balance of whole installation.

BOILER FURNACES

Wood-Refuse-Burning. Furnace for Burning Dry Wood Refuse, E. Winholt. Southern Engr., vol. 38, no. 6, Feb. 1923, pp. 52–53, 3 figs. Proper furnace construction for burning dry wood shavings and refuse.

BOILER TUBES

Failures. Boiler-Tube Failures, Haylett O'Neil. Power, vol. 56, no. 23, Dec. 5, 1922, pp. 876–878, 7 figs. In an eight-boiler plant employing single-pass horizontal baffling, tube failures to the number of 140 occurred in 60 days. Careful study revealed cause, and remedy applied reduced loss to less than five tubes per year.

BOILERS

Electric. Electric Steam Generation (Elektrische Dampferzeugung), Edgar Zeulmann. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 1, Jan. 6, 1923, pp. 7–12, 26 figs. Notes on generation of steam through electric resistance and particularly through electrode heating; structural features of electrode steam boilers.

Flue-Sheet Design. The Design and Proportioning of Flue Sheets, C. E. Lester. Boiler Maker, vol. 23, no. 2, Feb. 1923, p. 47, 3 figs. Spacing of flues; free circulation of water of more importance in design than providing maximum flue heating surface.

Gas-Fired. Gas Fired Steam Boiler Calculations, J. P. Leinroth. Gas Age-Rec., vol. 51, no. 5, Feb. 10, 1923, pp. 169–172, 1 fig. Uses for steam; steam problems; heating calculations; steam-heating coils; heating surfaces; size of boiler.

Heat Storage. The Storage Problem in Steam Economies (Das Speicherproblem in der Dampfwirtschaft), C. Kiesselbach. Stahl u. Eisen, vol. 43, no. 8, Feb. 22, 1923, pp. 265–273. Steam-chamber, water-chamber and feed-chamber accumulators; superiority of feed-chamber system; applicability of storage systems for low-, medium- and high-pressure steam systems; large feed-chamber boilers.

Locomotive. See LOCOMOTIVE BOILERS.

BOILERS, WATER-TUBE

Operation. Effect of Operating Conditions on Temperature of Water and Metal of Water-Tube Boilers (Der Einfluss der Betriebsverhältnisse auf Wasser- und Blechtemperatur im Wasserrohrkessel), P. Rönne. Zeit. des Bayer. Revisions-Vereins, vol. 27, nos. 2 and 3, Jan. 31 and Feb. 15, 1923, pp. 12–14 and 18–20, 7 figs. Experiments with Babcock & Wilcox boilers showing deformation, and raising and lowering of upper boilers at various conditions of operation, to draw conclusions as to loads to be allowed in upper boiler.

BORING MACHINES

Railway-Tire. Tyre Boring Mill Design. Machy. (Lond.), vol. 21, no. 541, Feb. 8, 1923, pp. 582–584, 6 figs. Recent developments that have taken place in Germany; details of tire-turning mill especially designed for inside machining of tires.

BUILDINGS

Mechanical Equipment. Meeting De Luxe Service Requirements. Power Plant Eng., vol. 27, no. 5, Mar. 1, 1923, pp. 255–265, 12 figs. Mechanical features of General Motors Building in Detroit, largest office building of its kind in world. Details of coal handling, boilers, refrigerating equipment, water systems, drinking-water sterilization, steam for heating, lighting and power distribution, elevators, etc.

C

CALCULATING MACHINES

Manufacture. The Manufacture of Calculating Machines. Eng. Production, vol. 6, nos. 124, 125 and 126, Feb. 15, 22 and Mar. 1923, pp. 159–162, 179–183 and 201–205, 49 figs. Methods in Felt &

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co.

Castings, Brass
Du Pont Engineering Co.

Castings, Die-Molded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Heavy
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
* Cole, R. D. Mfg. Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* McClave-Brooks Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Royersford Fdry. & Mch. Co.
* U. S. Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Vogt, Henry Machine Co.

Castings, Steel
* Falk Corporation
Link-Belt Co.
Mackintosh-Hemphill Co.

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
Chain Belt Co.
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corp'n

Charging Machines
Whiting Corp'n

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Cloth, Rubber
* Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works
Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Elect. Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring (Metal)
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
Novo Engine Co.
* Titusville Iron Works Co.
Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* U. S. Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.
* Simplex Valve & Meter Co.

Converters, Steel
Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
* Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.
Link-Belt Co.

Conveyors, Ice
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Coupling, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falk Corporation
* Fawcus Machine Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
* Medart Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Jib
* Brown Hoisting Machinery Co.
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Crucibles, Graphite
Dixon, Joseph Crucible Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Tarrant works at Chicago, Ill., engaged in production of comptometers.

CAR CONSTRUCTION

Tendencies in. Present Day Tendencies in Car Construction, E. R. Viberg. Can. Ry. Club, vol. 21, no. 9, Dec. 1922, pp. 20–42 and (discussion) 42–48. 5 figs. Review of early history; improvement of present construction; elimination of parts, lightening of equipment, reduction of friction, use of commercial run of steel, use of rust-resisting material, improvement of insulations, standardization of component parts, preservation of equipment by improved painting.

CAR WHEELS

Chilled-Iron. Properties of Chilled-Iron Car Wheels. Ry. Mech. Engr., vol. 97, no. 3, Mar. 1923, pp. 166–168. 4 figs. Investigation by University of Illinois of stresses due to mounting, static load and flange pressure; advantages from increased flange thickness.

CARBURETORS

Rayfield. Rayfield Marketing New Carburetor with Floating Venturi. Automotive Industries, vol. 48, no. 10, Mar. 8, 1923, pp. 568–569. 3 figs. New carburetor has concentric jets for intermediate and high speeds, respectively, and separate tube for idling conditions.

Tillotson Fixed Venturi. Tillotson Producing Fixed Venturi Carburetor Without Air Valves. Automotive Industries, vol. 48, no. 10, Mar. 8, 1923, p. 569. 1 fig. Instrument has two nozzles, one of which functions only during idling and low-speed operation; float valve made of monel metal.

Types. Improvements in Carburetors (Neuerungen an Vergasern), Kruger. Motor u. Auto, vol. 20, no. 2, Jan. 25, 1923, pp. 3–6, 6 figs. Discusses Schumm, Valenti, Weslake, Parker patents, their design and operation.

CARS, FREIGHT

Frameless Steel. Railway Rolling-Stock Developments. Ry. Engr., vol. 44, no. 517, Feb. 1923, pp. 64–67. 9 figs. Details of frameless steel car, spring-frame truck, and mild steel axle boxes, constructed by Gloucester Ry. Carriage & Wagon Co.

Loading of Steel Products. Safe and Economical Loading of Steel Products, W. R. Rogers. Ry. Mech. Engr., vol. 97, no. 3, Mar. 1923, pp. 168–170 and (discussion) 170–172. Loading metal sheets and plates in box cars; single overhanging loads of concrete bars; twin loads of long flexible concrete bars. Paper before Interchange Car Inspectors' and Car Foremen's Convention.

Underframe and Truck Design. Underframe and Truck Design for C. M. & St. P. Ry. Cars. Ry. Rev., vol. 72, no. 9, Mar. 3, 1923, pp. 356–365, 12 figs. General principles and calculations involved in design of standard underframe and trucks applicable to several types of freight cars.

CAST IRON

Graphitization. Experiments on the Rapid Graphitization of White Cast Iron and a Theory for the Mechanism of Graphitization, Anson Hayes, W. J. Diederichs and W. M. Dunlap. Am. Soc. for Steel Treating—Trans., vol. 3, no. 6, Mar. 1923, pp. 624–637 and (discussion) 637–639, 19 figs. Results of experiments; photomicrographs showing typical structures obtained in investigation; physical properties of specimens tested.

Properties. The Properties of Cast-Iron. Eng. Production, vol. 6, no. 124, Feb. 15, 1923, pp. 164–165, 3 figs. Characteristics of principal constituents.

CENTRAL STATIONS

Additions 1923. Additions and Extensions During 1923 Estimated at $602,143,000. Elec. World, vol. 81, no. 10, Mar. 10, 1923, pp. 569–570, 1 fig. Survey indicates that 2,890,400 kw. will be added to generating plants by central-station companies.

Comines, France. The Thermoelectric Central Station at Comines (La central thermo-électrique de Comines), M. Emanaud. Technique Moderne, vol. 15, no. 2, Jan. 15, 1923, pp. 43–47, 4 figs. Second largest station in France; equipment and operation, including turbo-alternators, Babcock & Wilcox boilers, condensers, switchboard arrangement, etc.

Oil-Fuel vs. Steam-Engine. Fuel Oil Engines versus Steam Engines for Small Municipal Plants, George T. Prince. Am. City, vol. 28, no. 1, Jan. 1923, pp. 33–34, 1 fig. Deals with plants which supply electric current and pump water for communities of 10,000 population or less. Comparisons. States that for towns of less than 10,000 population it is advisable to install steam-driven power plants.

Small Diesel-Engined. Operating a Small Oil-Engined Central Station. Oil Engine Power, vol. 1, no. 2, Feb. 1923, pp. 66–68 and 100, 2 figs. Describes equipment of Holstein Service Co., Inc., Holstein, Iowa, which serves requirements of domestic and municipal load, consisting of two vertical 4-cylinder 4-cycle Busch-Sulzer Diesel engines; record of operating costs of Diesel engines for 1921 and 1922.

CHAINS

Malleable, Casting Links for. Casts Malleable Chain Links, Herbert R. Simonds. Foundry, vol. 51, no. 5, Mar. 1, 1923, pp. 185–187, 4 figs. Chain assembled from individual links molded on power squeeze machine from metal-gated pattern; annealed in pots packed with mill scale.

CHARTS

Graphic, Construction of. Method of Constructing Charts from Standardized Materials, John D. East. Management Eng. (Summary Sheet), vol. 4, no. 3, Mar. 1923, pp. 203–208, 12 figs. Method for facilitating construction of graphic charts and materially reducing cost of their preparation.

CHIMNEYS

Steel. Considerations in Designing Steel Stacks. Boiler Maker, vol. 22, no. 10, Oct. 1922, pp. 288–289, 3 figs. Amount of draft required, allowable wind pressure on given size stacks and method of staying. Reprinted from Locomotive.

Wind Pressure in Design. Wind Pressure in Chimney Design, W. Wallace Christie. Power, vol. 57, no. 12, Mar. 20, 1923, pp. 438–439. Formulas compared; what wind velocity and base pressure to choose; live load produced by wind conditions.

CHROME-NICKEL STEEL

Structure. Structure of Chromium-Nickel Steel, H. B. Pulsifer and O. V. Greene. Chem. & Met. Eng., vol. 28, no. 8, Feb. 21, 1923, pp. 354–356, 6 figs. Series of micrographs fail to show any change in structure in quenched Cr:Ni steel after various draws, despite large differences in physical properties; precautions needed in etching and photographing.

CHROME-VANADIUM STEEL

Thermal Transformations. Thermal Transformations in Some Chrome-Vanadium Steels, J. S. Vanick and W. W. Sveshnikoff. Am. Soc. for Steel Treating—Trans., vol. 3, no. 5, Feb. 1923, pp. 502–533, 31 figs. Study of movement with changes in composition, initial temperature and rate of cooling of thermal transformations in series of chrome-vanadium steels was made, and correlated with difference in hardness and microstructure, to indicate possible changes in constitution.

CLUTCHES

Motor-Bus. A New Clutch in Use on Paris Omnibuses, Maurice Dubois. Elec. Ry. & Tramway Jl., vol. 48, no. 1166, Jan. 12, 1923, p. 27, 1 fig. Notes on multiple-plate type, which responds exactly to exigencies of Paris motor-bus conditions. From Industire des Tramways, Chemins de Fer, et Transports Publics Automobiles.

COAL HANDLING

Plants. Coaling and Storage Plant at Panama, J. W. McFarlane. Coal Industry, vol. 6, no. 2, Feb. 1923, pp. 133–135, 4 figs. Methods used in storing and handling large quantities of coal; subaqueous storage used; spontaneous combustion controlled, despite climatic conditions.

Mechanical Handling at the Billancourt Central Station (La manutention mécanique dans la centrale électrique de Billancourt), R. Bouvattier. Revue Industrielle, vol. 53, no. 16, Feb. 1923, pp. 41–46, 7 figs. Apparatus and their operation for coal handling and ash removal for 120,000 kg. steam per hour plant.

Pneumatic Plants. Coal Handling by Suction. Elec. Times, vol. 63, nos. 1632 and 1635, Jan. 25 and Feb. 15, 1923, pp. 81–82, 3 figs., and 155–156, 4 figs. Jan. 25: Pneumatic plant for dealing with coal clinker and ashes at cocoa factory in York, England, with capacity of 25 tons per hr. when handling coal and 18 tons per hr. when dealing with ashes. Feb. 15: Installation at North Metropolitan power station, Brimsdown.

Unloader. A Novel Plant for the Unloading of Bulk Goods (Eine bemerkenswerte Anlage zum Umschlag von Schüttgut), Hubert Hermanns. Glasers Annalen, vol. 92, no. 2, Jan. 15, 1923, pp. 33–35, 6 figs. Arrangement for loading and unloading of coal, gravel, stone rubble, etc., built by Heinzelmann & Sparmberg, Hannover, Germany.

COLD

Generation and Utilization. The Generation and Utilisation of Cold. Faraday Soc.—Trans., vol. 18, part 2, Dec. 1922. Contains following articles: Part I: General Introduction, Alfred W. Porter, pp. 139–143, 2 figs. On Lowest Temperature yet Obtained, H. Kamerlingh Onnes, 145–174, 9 figs. Apparatus and Methods in the Leiden Cryogenic Laboratory, C. A. Crommelin, 175–196, 4 figs. Ethyl Chloride, C. F. Jenkin, 197–199. Discussion, 199–203, 1 fig. Part II: Industrial Methods of Liquefaction and Practical Applications of Low Temperatures—General Survey, K. S. Murray, 205–218, 6 figs. Manufacture of Hydrogen by Partial Liquefaction of Water Gas and Coke-Oven Gas, Georges Claude, 219–223, 2 figs. The Production of Liquid Oxygen for Use on Aircraft, Edgar A. Griffiths, 224–239, 12 figs. The Heylandt Liquid Air Plant, A. J. Bremner, 240–242, 1 fig. Thermometric Lag with Especial Reference to Cold Storage Practice, Ezer Griffiths and J. H. Aubery, 243–251, 5 figs. Some Materials of Low Thermal Conductivity, Ezer Griffiths, 252–258. The Metallurgical Aspect of the Production of Cold, Cosmo Johns, 259–261. A Note on the Importance of the Study of the Crystal Structure and Properties of Metals at Low Temperatures, Cosmo Johns, 262–263. Discussion, 264–273.

COMBUSTION

Control. Combustion Control for Steam Boilers, Charles H. Smoot. Power, vol. 57, no. 10, Mar. 6, 1923, pp. 354–356. Author visualizes what is going on when burning coal on grate and gives reasons for difference in thickness of fuel bed required, when burning different kinds of coal.

Temperature of. Determination of Temperature of Combustion (Zur Ermittlung von Verbrennungstemperaturen), F. Pollitzer. Zeit. für angewandte Chemie, vol. 35, no. 97, Dec. 5, 1922, pp. 683–684, 1 fig. New method for graphic determination; values found are considerably lower than those of previous determinations.

CONDENSERS, STEAM

Auxiliary Equipment. Auxiliary Equipment for Condensers, Charles L. Hubbard. Southern Engr., vol. 39, no. 1, Mar. 1923, pp. 50–55, 21 figs. Various types of pumps and other devices employed in connection with condensers for circulating cooling water and removing condensate and air, also piping arrangement for steam and water.

Jet and Barometric. Jet and Barometric Condensers, Charles L. Hubbard. Southern Engr., vol. 38, no. 6, Feb. 1923, pp. 47–51, 15 figs. How various designs operate, especially with reference to water distribution.

Surface. Large Surface Condensing Plant. Beama, vol. 12, no. 58, Feb. 1923, pp. 122–124, 9 figs. Mirrlees-Watson 3000-kw., 6000-kw. and 12,000-kw. surface condensers installed at Leeds Corp. Electricity Works.

CONNECTING RODS

Locomotive. New Type of Connecting Rod for Electric Locomotives (Nouveau type de transmission par bielles pour locomotives électriques), Joseph Bianchi. Revue Générale des Chemins de Fer et des Tramways, vol. 42, no. 2, Feb. 1923, pp. 105–112, 9 figs. Describes new type of articulated connecting rod which has been recently tried on Italian high-speed three-phase locomotive E 330-14 and proved satisfactory; advantages of triangular types used hitherto; weight of articulated system; counterweights.

CONVEYORS

Bearings for, Anti-Friction. Anti-Friction Bearings for Conveyors. Iron & Coal Trades Rev., vol. 106, no. 2869, Feb. 23, 1923, p. 267, 3 figs. Results of series of tests on 48-in. conveyor. Discusses power costs, belting and lubrication costs. See also Colliery Guardian, vol. 125, no. 3243, Feb. 23, 1923, p. 452, 2 figs.

CORROSION

Blue Lead as Preventive. Blue Lead as a Rust Preventative. Gas Age-Rec., vol. 51, no. 10, Mar. 10, 1923, pp. 301–303 and 314, 8 figs. Sublimed blue lead, a fume product made from galena, is said to hold nearly all qualities of perfect rust preventive; its manufacture.

COST ACCOUNTING

Foundries. Figuring Costs from Material to Product, A. Luenberg. Can. Foundryman, vol. 13, no. 12, Dec. 1922 and vol. 14, no. 1, Jan. 1923, pp. 18 and 21, and 32–34, 8 figs. How to find cost of rough castings; prime cost and how to find it; accurate and practical way to record foundry operation; timekeeping methods.

Manufacturing Costs. Manufacturing Costs, F. C. Lawrence. Indus. Management (Lond.), vol. 9, nos. 1 and 2, Jan. 11 and 25, 1923, pp. 11–14 and 42–44. Example of methods of calculating job costs; use of mechanical appliances in various calculations; functions of work-in-progress account; effect of inaccuracy is traced through costs to show delay and unreliability caused thereby. (Abstract.)

Time Study and. The Relation of Time Study to Cost Accounting, R. W. Darnell. Indus. Management (N. Y.), vol. 64, nos. 5 and 6, Nov. and Dec. 1922, pp. 272–278 and 341–345, 4 figs. Nov.: Practical considerations in rate setting. Dec.: Premium plan of wage payment.

COUPLINGS

Flexible. The Wellman-Bibby Compensating Shaft Coupling. Mar. Engr. & Naval Architect, vol. 46, no. 546, Mar. 1923, pp. 91–92, 4 figs. Details of design of flexible coupling developed by Wellman-Bibby Co., and its application to Diesel-engine-driven ships.

CRANES

Electric. Electric Cranes, F. H. Woodhull. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 2, Feb. 1923, pp. 41–44. Problems of design of electric cranes used in steel works.

Mobility in Loading. Motor Transport, vol. 36, no. 937, Feb. 12, 1922, pp. 193–194, 3 figs. Constructional details and performance of Ransome electric runabout crane.

The "Ransome" Electric Runabout Crane. Ry. Gaz., vol. 38, no. 6, Feb. 9, 1923, p. 193, 2 figs. Development of "Orwell" electric truck designed to expedite and facilitate the handling operations in workshops, warehouses, goods sheds, etc. See also Elec. Times, vol. 63, no. 1635, Feb. 15, 1923, pp. 159–160, 5 figs. and Elec. Rev., vol. 92, no. 2360, Feb. 16, 1923, pp. 250–251, 1 fig.

Harbor. Fifty Years' Engineering Work in the Ruhr District in the Building of Harbor Cranes (50 Jahre Ingenieurarbeit des Ruhrbezirks im Hafenkranbau der Welt), H. Kessner and H. Krahnen. Schiffbau, vol. 24, no. 18, Jan. 31, 1923, pp. 280–289, 17 figs. History of development of various types.

Steel-Mill. Some Steel Mill Crane Problems, A. J. Standing. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 2, Feb. 1923, pp. 33–36. Notes on operation and maintenance.

CRANKPINS

Bearing Design. An Analytical Study of Crank-Pin Bearing Design and Lubrication, G. D. Angle. Automotive Industires, vol. 48, nos. 9, 10 and 11, Mar. 1, 8 and 15, 1923, pp. 520–523, 571–574, 12 figs. and 623–626, 11 figs. Rigidity said to be factor of prime importance; polar diagrams used to determine magnitude and direction of bearing loads. Fundamentals of lubrication; necessity of perfect lubrication. Recommends that oil hole be located in low-pressure region as shown by comparative wear

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Alphabetical List on page 138

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* Reading Steel Casting Co. (Inc.)
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* Vogt Henry, Machine Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

diagrams; relation between oil-hole diameter, pressure-bearing clearance and oil flow are experimentally established.

CUPOLAS

Blast-Pipe Layout. Method of Laying Out a Cupola Blast Pipe, C. B. Lindstrom. Boiler Maker, vol. 23, no. 2, Feb. 1923, pp. 40–41, 7 figs. Development of sections of pipe with details of the various section patterns.

CUTTING TOOLS

Diamond, for Vulcanite. Diamond-cutting Tools for Vulcanite, W. Richards. Machy. (Lond.), vol. 21, no. 541, Feb. 8, 1923, pp. 598–599, 2 figs. Manufacture of vulcanite pen section.

D

DIES

Universally Adjustable. The Turk's Head, C. E. Davies. Metal Industry (Lond.), vol. 22, no. 5, Feb. 2, 1923, pp. 99–100, 4 figs. Describes universally adjustable die head for square and rectangular sections, known as "Turk's Head," which is especially valuable in cases where good finish, accuracy and square corners are required.

DIESEL ENGINES

Care and Maintenance. Care and Maintenance of Diesel Engines, Geo. E. Windeler. Oil Engine Power, vol. 1, nos. 1 and 2, Jan. and Feb. 1923, pp. 28 and 33–34, and 76–80, 6 figs. River or canal water for cooling; crankshafts; fuel or injection valve; packing of fuel valves; fuel pumps; valve adjustments; exhaust valves and casings; starting; treatment and storage of lubricating oil, etc. Read before Diesel Engine Users Assn.

Forge Plants. Diesel Engines for Forge-Plant Power. Oil Engine Power, vol. 1, no. 1, Jan. 1923, pp. 18–21, 6 figs. Installation and operation of four Nordberg-Carels 2-cycle sets at Oklahoma Iron Works, Tulsa, Okla., for providing power for forge hammer and general plant electric service, results in great economies.

Lubrication. Lubrication of Diesel Engines, Harold Moore. Oil Engine Power, vol. 1, no. 1, Jan. 1923, pp. 15–16. Resume of past international experiences. Requirements of engine as regards lubrication; recommendations of specifications published by Diesel Engine Users' Assn., England, which investigated entire subject of stationary oil-engine lubrication.

Steam Power vs. Oil-Engine or Steam Power, Stanley Wright. Oil Engine Power, vol. 1, no. 2, Feb. 1923, pp. 58–63, 4 figs. Comparison of simplicity of Diesel plant with typical steam station, with observations on relative costs of operation and on results obtained in combined steam and Diesel plants; advantages of Diesels for stations up to 5000 kw. capacity.

DRAWINGS

Stereotyped Forms. Stereotyped Drawing Forms, C. B. Kearney. Indus. Management (Lond.), vol. 9, no. 4, Feb. 22, 1923, pp. 102–103, 5 figs. Particular reference is made to individual drawings for components of assembled product.

DRILLING MACHINES

Radial. The "Right Line" Radial Drilling Machine. Machy. (Lond.), vol. 21, no. 543, Feb. 22, 1923, pp. 646–648, 6 figs. New type developed by Niles-Bement-Pont Co., London.

DRYING

Thermodynamics of. Contribution to the Thermodynamics of Drying (Beitrag zur Thermodynamik des Trocknens), F. Merkel. Zeit. des Vereines deutscher Ingenieure, vol. 67, nos. 4 and 5, Jan. 27 and Feb. 3, 1923, pp. 81–84 and 106–108, 9 figs. Laws of heat consumption with drying; dependence of heat consumption on working conditions; temperature of hot air, drying of air through cooling off.

DURALUMIN

Properties and Heat Treatment. Duralumin—A Digest of Information, Horace C. Knerr. Am. Soc. for Steel Treating, vol. 3, no. 1, Oct. 1922, pp. 13–42, 18 figs. Composition; chemical and physical constitution; manufacture; casting; forging; heat treating; resistance to corrosion; industrial applications. Bibliography and references.

E

ECONOMIZERS

Water-Spray Cleaning. Economizer Cleaned by Washing While Operating. Power Plant Eng., vol. 27, no. 6, Mar. 15, 1923, pp. 326–327, 3 figs. New type of steel tube economizer, known as Foster economizer, has water spray for cleaning; steel tubes are enclosed by cast-iron gilled rings.

EDUCATION, ENGINEERING

Progress. Engineering Education. Am. Soc. Civ. Engrs.—Proc., vol. 49, no. 3, Mar. 1923, pp. 491–523. Contains following papers: The New Project for the Society for the Promotion of Engineering Education, Charles F. Scott; The Outlook for the Engineering Schools of the Middle West, William G. Raymond; Coöperation of National Engineering Societies in Engineering Education, John L. Harrington.

ELECTRIC FURNACES

Electrodes. The Söderberg Continuous Electrode and Its Use in Italy (L'elettrodo continuo Söderberg e le sue prime applicazioni in Italia), Livio Cambi. Giornale di Chimica Industriale ed Applicata, vol. 5, no. 1, Jan. 1923, pp. 7–9, 2 figs. Advantages; some Italian furnaces where they are used with satisfaction.

Ferrovanadium. Electric Furnace Makes Ferro-Vanadium, B. D. Saklatwalla and A. N. Anderson. Elec. World, vol. 81, no. 8, Feb. 24, 1923, pp. 452–456, 6 figs. New electrometallurgical process for reduction of ferrovanadium by carbon; operation made possible by development of type of electric furnace different from those previously designed.

Hardening. Electric Hardening Furnaces (Der elektrische Härteofen), Wintermeyer. Elektrotechnischer Anzeiger, vol. 40, no. 24, Feb. 10, 1923, pp. 178–181, 1 fig. Hardening and annealing of tool steels; Lorenz, Tioga Iron & Steel Co., and A. E. G. types of resistance furnaces.

Induction. The Induction Furnace for Brasses and Bronzes (Le four à induction pour la préparation des laitons, bronzes, etc.). Industrie Électrique, vol. 32, no. 734, Jan. 25, 1923, pp. 25–26, 3 figs. Design and operation.

Metal-Melting and Heat-Treatment. Electrical Melting and Heat Treatment, Verdon O. Cutts. Metal Industry (Lond.), vol. 22, no. 6, Feb. 9, 1923, pp. 123–125, 3 figs. General principles of electrothermics, particularly in respect to melting of nonferrous metals, and with special reference to Baily resistance furnace; electrical furnaces for heat treatment.

The Electric Furnace in Metallurgy, J. Kent Smith. Metal Industry (Lond.), vol. 22, no. 9, Mar. 2, 1923, pp. 193–194. Importance of furnace atmosphere; discusses induction, direct arc, radiation, and crucible furnaces; melting in vacuo.

Steel. New Electric Furnace for Making Steel (Novo forno electrico para a fabricaçao do aço). Revista Brasileira de Engenharia, vol. 5, no. 1, Jan. 1923, pp. 37–40, 4 figs. Describes Italian Fiat furnace, manufactured by A. E. G. and Deutsche Maschinen Fabrik A. G.; consumption of current and electrodes.

ELECTRIC LOCOMOTIVES

Baldwin-Westinghouse. All-Electric Passenger Service for New Haven, W. J. Clardy. Ry. Age, vol. 74, no. 15, Mar. 17, 1923, pp. 767–769, 3 figs. Twelve new 180-ton Baldwin-Westinghouse passenger locomotives under construction, of 2-6-2 + 2-6-2 type equipped with 6 twin motors and will operate from 11,000-volt, single-phase trolley, or 650-volt, d. c. third rail.

Control of A. C. A.-C. Locomotive Control, Ivan Döry. Elec. Ry. J., vol. 61, no. 5, Feb. 3, 1923, pp. 199–200, 4 figs. Review of plans used for varying voltage in European single-phase locomotives, leading up to account of inductive regulator with brush shift. From Elektrotechnische Zeit.

Narrow-Gage. Recent Improvements in Electric Narrow-Gage Locomotives (Perfectionnements récents dans les locomotives électriques à voie étroite), Helde. Revue Générale de l'Electricité, vol. 13, no. 7, Feb. 17, 1923, pp. 257–261, 5 figs. General Electric, Gottwald-Muller, Bernina, and Brown-Boveri types.

New Zealand Midland Ry. New Electric Locomotives for the Midland Railway of New Zealand. Ry. Engr., vol. 44, no. 517, Feb. 1923, pp. 50–51, 2 figs. Two separate types, one for main-line working and other of battery type for general shunting and inspection service, constructed by Eng. Elec. Co., Ltd., at Preston.

Paris-Orleans Railway. 1400-Hp. Electric Locomotive for the Paris-Orleans Railway (Locomotives électriques de 1400 ch. pour le chemin de fer de Paris-Orléans). Industrie Électrique, vol. 32, no. 734, Jan. 25, 1923, pp. 27–28. Tractive effort 7000 kg. at 10.2 km.p.h., and 5500 kg. at 58.9 km.p.h.; individual axle drive.

Storage-Battery. The Radius of Action of Storage-Battery Cars and Locomotives (Der Aktionsradius der Akkumulatoren-Eisenbahnfahrzeuge), F. Christen. Schweizerische Bauzeitung, vol. 81, nos. 4 and 5, Jan. 27 and Feb. 3, 1923, pp. 35–38 and 54–56, 7 figs. Discusses feasibility in comparison with other drives. Includes tabular data on storage-battery locomotives and railway motor cars of the Swiss Fed. Rys., Prussian-Hessian State Ry., Brown, Boveri & Cie., and Westinghouse Elec. & Mfg. Co.

Swiss. A New Type of Electric Locomotive (Un nouveau type de locomotive électrique), Henri Marchand. Nature, no. 2548, Feb. 3, 1923, pp. 74–77, 4 figs. Describes latest Swiss locomotives, single-phase a. c.

ELECTRIC WELDING, ARC

Apparatus and Equipment. Electric Arc Welding Apparatus and Equipment, J. Caldwell. Instn. Elec. Engrs.—Jl., vol. 61, no. 315, Feb. 1923, pp. 253–268 and (discussion) 268–277, 21 figs. Deals with physical features of iron arc as used for welding ferrous metals; general types of apparatus and equipment developed, with examples of each type. Bibliography. Experimental results.

Iron and Steel. Notes on the Welding of Iron and Steel with the Electric Arc, Fred H. Williams. Can. Inst. Min. & Metallurgy—Monthly Bul., no. 131, Mar. 1923, pp. 149–169, 16 figs. Notes on welding of steel places, steel castings, shafting and welding of cast iron; tests show that flux-coated electrodes permit obtaining highest tensile strength. Tabulated results of tests.

Steel Structures. Arc Welding of Steel Structures, F. P. McKibben. Am. Welding Soc.—Jl., vol. 2, no. 2, Feb. 1923, pp. 24–52, 23 figs. Effect of welding on design; practice in steel-bridge construction; steps in building steel structure; welding of steel; test data on arc welding; examples of electrically welded steel structures.

ELECTRIC WELDING, RESISTANCE

Developments. Some Recent Developments and Uses for Resistance Welding, H. A. Woofter. Am. Welding Soc.—Jl., vol. 1, no. 10, Oct. 1922, pp. 38–40. Discusses developments in seam welding, spot welding, and butt welding.

ELEVATORS

Electric, Inspection of. Electric Elevator Inspection, J. M. Walsh. Indus. Engr., vol. 81, no. 2, Feb. 1923, pp. 72–80, 9 figs. Outlines inspection schedule; what inspector should look for, and how to make adjustments that are necessary.

EMPLOYEES

Explaining Finances to. Company Finances Brought Home to Employees, Charles M. Ripley. Management Eng., vol. 4, no. 3, Mar. 1923, pp. 153–156, 5 figs. Way to explain division of income into wages, salaries and dividends. Plan of Gen. Elec. Co.

EMPLOYEES' REPRESENTATION

Bethlehem Steel Co. Employee Representation at the Bethlehem Steel Co., J. M. Larkin. Min. & Metallurgy, vol. 4, no. 194, Feb. 1923, pp. 81–82. Describes plan which has been in operation since October, 1918, and its success; advantages claimed to outweigh criticisms; compensation and relief measures.

EMPLOYMENT MANAGEMENT

Psychotechnical Tests. The Systematic Collection of Psychotechnical Adaptability Tests and Their Importance (Die systematische Sammlung psychotechnischer Eignungsproben und ihre Bedeutung), Hans Rupp. Maschinenbau (Betrieb), vol. 2, no. 8, Jan. 26, 1923, pp. 865–870. Discusses system of tests arranged by Committee on Economic Production, involving eye and hand tests; technical comprehension; and general ability.

ENGINEERING

Economics of. Economics of Engineering, Charles C. Garrard. Eng. Rev. & Trader, vol. 36, no. 7, Jan. 1923, pp. 205–210. Social and economic problems; investigation by engineer; unemployment; curve of prosperity; private and public enterprise; commercial training; industrial organization; public-utility undertakings. Based on presidential address before Junior Instn. Engrs.

ENGINEERING SOCIETIES

Federated American Engineering Societies. History and Review of Work of Federated American Engineering Societies. Federated Am. Eng. Soc.—Bul., vol. 2, no. 2, Feb.–Mar. 1923, pp. 1–9. Composition of F.A.E.S. for 1923; work in which it has taken active part since its organization.

The Federated American Engineering Societies, Mortimer E. Cooley. Engrs. & Eng., vol. 39, no. 12, Dec. 1922, pp. 419–421. Its object and some of its possibilities.

EVAPORATORS

Flash. Operating Characteristics of Flash Evaporators, John Forbes. Power Plant Eng., vol. 27, no. 6, Mar. 15, 1923, pp. 311–313, 2 figs. High- and low-pressure and single- and multiple-effect evaporators are compared.

Low-Pressure. Savings Effected by Evaporator, John Forbes. Power Plant Eng., vol. 27, no. 5, Mar. 1, 1923, pp. 269–270, 1 fig. Low-pressure evaporator for make-up water introduces saving in plant operation.

F

FATIGUE

Industrial. The Relation of Fatigue and Accuracy to Speed and Duration of Work, B. Muscio. Indus. Management (Lond.), vol. 9, no. 4, Feb. 22, 1923, pp. 112–114, 1 fig. Experimental data bearing upon question whether rate of movement (speed of production) of "fatigue" is chief factor in hourly variations in numbers of industrial accidents. Summary of report of Indus. Fatigue Research Board.

FERROMANGANESE

Molten. Molten Ferromanganese, Frank Hodson. Iron Age, vol. 111, no. 10, Mar. 8, 1923, p. 667. Advantages from use of electrically melted alloy in steel making; savings possible; use of manganese ore.

FERROVANADIUM. See ELECTRIC FURNACES, Ferrovanadium.

FLIGHT

Experimental Work. The Practical Importance of the Free Flight Work of the National Advisory Committee for Aeronautics, Thomas Carroll. Aerial Age, vol. 16, no. 3, Mar. 1923, pp. 112–114 and 119, 7 figs. Discusses flight work of aerodynamic section.

FLYWHEELS

Rolling-Mill Motors. Fly-Wheels on Rolling Mill Drives, F. R. Burt. Blast Furnace & Steel Plant, vol. 11, no. 3, Mar. 1923, pp. 201–204, 3 figs. Dis-

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flooring, Rubber
United States Rubber Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Furnace & Burner Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Foundry Equipment
Northern Engineering Works
Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Whiting Corp'n

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Kenworthy, Chas F. (Inc.)

Furnaces, Forging
Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
Kenworthy, Chas F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Whiting Corp'n

Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co.
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
* Johns-Manville (Inc.)

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Glasses
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Gages, Differential Pressure
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Draft
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Liquid Level
* Bristol Co.
* Lunkenheimer Co.
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
* Norma Co. of America

Gages, Pressure
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gages, Water Level
* Bristol Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge and Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gas Analysis Apparatus
* Precision Instrument Co. (Inc.)

Gas Collectors
* Precision Instrument Co. (Inc.)

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Gasoline
Texas Co.

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.

Gears, Cut
Brown, A. & F. Co.
Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Philadelphia Gear Works
* Poole Engrg. & Mch. Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Herringbone
* Falk Corporation

Gears, Machine Molded
Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.
Philadelphia Gear Works

Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Falk Corporation
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.
Link-Belt Co.
* Poole Engrg. & Mach. Co.
* Westinghouse Electric & Mfg. Co.

Gears, Worm
Chain Belt Co.
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Westinghouse Electric & Mfg. Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co.

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave-Brooks Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* McClave-Brooks Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grates, Kiln
* McClave-Brooks Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* McClave-Brooks Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Grinding Machinery
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Guards (Electric Lamp)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Franklin Machine Co.
Long & Allstatter Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hangers, Shaft
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball)
* S K F Industries (Inc.)

Hangers, Shaft (Roller)
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mach. Co.

Hangers, Shaft (Roller Bearing)
* Hyatt Roller Bearing Co.

Hard Rubber Products
United States Rubber Co.

Hardening
* American Metal Treatment Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

Heaters, Water Supply
Herbert Boiler Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

causes various mill power loads and rolling characteristics which determine advisability of flywheels for such service.

FORGING

Problems. Forging. Maschinenbau (Betrieb), vol. 2, no. 9, Feb. 8, 1923. Three articles, as follows: Investigations of Deformation with Special Regard to Forging (Untersuchungen über die bildsame Formänderung unter besonderer Berücksichtigung des Schmiedens), E. Siebel, pp. 875–880, 15 figs. Steel Casting vs. Forging (Stahlformguss gegen Schmieden), Richard Krieger, pp. 880–882, 9 figs. The Cause of Excessive Wear of Swages in the Hot Forging of Brass (Die Ursache grossen Gesenkverschleisses beim Warmschmieden von Messing), C. Boye, pp. 883–884, 5 figs.

FOUNDRIES

Aluminum. Aluminum Foundry Practice. Eng. Production, vol. 6, no. 120, Jan. 18, 1923, pp. 61–63, 10 figs. Procedure of Dayton Eng. Laboratories Co., Dayton, Ohio.

Brass. A Modern Brass Foundry. Metal Industry (Lond.), vol. 22, no. 6, Feb. 9, 1923, p. 129, 1 fig. Method of ventilating melting room in a brass foundry by natural-draft ventilation.

Central Europe. Modern Foundries of Central Europe, Bruno Schapira. Foundry, vol. 50, no. 22, Nov. 15, 1922, pp. 900–905 and 908, 11 figs. Discusses foundry practice in general and describes foundry in Steyr, Austria, finished in 1920.

Coöperation with Pattern Shop. Coöperation between Drawing Office, Pattern Shop and Foundry, F. C. Edwards. Foundry Trade Jl., vol. 27, no. 340, Feb. 22, 1923, pp. 156–159. Discusses quantity production; coöperation of patternmaker; molders' coöperation with drawing office; advantages of coöperation are summarized.

Steel. The Steel Foundry, South African Railway Workshops, Pretoria: Its Equipment and Operation, G. A. Guthrie. S. African Instn. Engrs.—Jl., vol. 21, no. 7, Feb. 1923, pp. 139–142. Details of building and equipment.

Technical Vocabulary. Technical Vocabulary of the Foundry, Pendleton Powell. Brass World, vol. 19, nos. 1 and 2, Jan. and Feb. 1923, pp. 4–7 and 39–42, 31 figs. Memorandum presented to Congress of Foundries held at Liège, Belgium, on terms agreed upon to designate distinctly objects used in foundry or operations or manipulations effected, by Ivan Lamoureaux, together with additional definitions gathered from various sources.

FREIGHT HANDLING

Container System. Cargo Containers for Ocean Use. Mar. Rev., vol. 53, no. 3, Mar. 1923, pp. 91–94, 3 figs. System has proved economical on railroads. Description of containers constructed by Ingalls Iron Works Co. for Munson Steamship lines; built of steel plates and structural shapes throughout, 6 ft. by 7 ft. by 7 ft. high, giving capacity of 294 cu. ft.; advantages anticipated; changes in design.

FUELS

Canada, Situation in. The Fuel Situation in Canada. B. F. Haanel. Can. Inst. Min. & Metallurgy—Monthly Bul., no. 131, Mar. 1923, pp. 75–82. Points out that of 30,000,000 tons consumed in Canada, nearly 60 per cent is imported from United States. Suggestions for improving adverse condition.

Coke Breeze as Boiler Fuel. Experiences in the Burning of Coke Breeze with Coal-Gas Addition in Large Boiler Houses (Erfahrungen bei der Verbrennung von Koksgrus unter Zusatz von Leuchtgas in grösseren Kesselhausbetrieb), H. Wilde. Gas- u. Wasserfach, vol. 65, no. 51, Dec. 22, 1922, pp. 809–812, 4 figs. Total efficiency of 75 per cent was obtained in installation in electrical works in Kiel.

Comparative Costs. Comparative Fuel Costs of Coal and Oil, E. T. McCarthy. Power, vol. 57, no. 12, Mar. 20, 1923, pp. 446–447, 1 fig. Presents diagram for comparing cost of fuels on heat-unit and efficiency basis and for working special problems with coal and oil.

Economical Use. Fuel Economy Secured by Organization, J. H. Blakey. Power Plant Eng., vol. 27, no. 6, Mar. 15, 1923, pp. 317–319, 1 fig. European countries study economical use of fuel and supervise boiler plants; instrument developed for studying vibration.

Slag, Recovery from. Recovers Fuel from Slag and Ashes, F. A. Brackmann. Power, vol. 57, no. 9, Feb. 27, 1923, pp. 322–323, 5 figs. By means of strong magnets acting on ferric acids to which silicates and lime adhere, slag is separated from combustible.

[See also NATURAL GAS; OIL FUEL; PULVERIZED COAL.]

FURNACES, FORGING

Swedish. Swedish Welding and Forging Furnaces (Värmetekniska undersökningar a nagra svenska valloch smidesugnar), A. Hallbäck. Jernkontorets Annaler, vol. 107, Special No., May 31, 1922, pp. 263–414, 91 figs. Construction of furnaces; fuel consumption; heat balance; flue gases; preheating; heat losses; etc.

FURNACES, HEATING

Plates. New Design of Continuous Furnace. Iron & Coal Trades Rev., vol. 106, no. 2866, Feb. 2, 1923, p. 155, 2 figs. Furnace designed by Priest Furnaces, Ltd., for either producer or semi-gas firing; when working on sleeper plates, it will deliver to presses at least 3 plates per min.

FURNACES, METALLURGICAL

Schürmann. The Schürmann Furnace and Preheater (Der Schürmann-Schmelzofen mit Winderhitzer), Hörnig. Zeit. für die Gesamte Giessereipraxis, vol. 44, no. 5–6, Feb. 10, 1923, pp. 33–35, 5 figs. Heat balance of furnace; quantity of coal and coke used; cost data.

G

GAS ENGINES

Enclosed Forced-Lubrication. Gas Engines of the Enclosed Forced-Lubrication Type. Beama, vol. 12, no. 58, Feb. 1923, pp. 115–116, 5 figs. Features of Browett-Lindley gas engines.

Schneider. Large Gas Engines of the Schneider Company. Iron & Coal Trades Rev., vol. 106, no. 2869, Feb. 23, 1923, pp. 264–265, 5 figs. partly on p. 266. Details of gas-blowing engines and their use for driving generators.

GAS PRODUCERS

Mechanically Operated. Mechanically Operated Producer. Gas Age-Rec., vol. 51, no. 9, Mar. 3, 1923, p. 275, 2 figs. Compact and high-duty form of revolving producer, using bituminous coal.

GASOLINE

Carburation. An Experimental Survey of Gasoline and Kerosene Carburetion, C. S. Kegerreis and G. A. Young. Soc. Automotive Engrs.—Jl., vol. 2, no. 1, Jan. 1923, pp. 63–75, 39 figs. Reasons for present wastage of fuel; gasoline carburetion requirements; comparison of gasoline and kerosene; temperature requirements of fuels; detonation; effect of load; fuel-air mixture requirements for engines; commercial metering characteristics.

Future Production. Gasoline Ten Years Hence, Ralph H. McKee. Chem. & Industry, vol. 42, no. 9, Mar. 2, 1923, pp. 193–196. Discusses cracked and casinghead gasoline and gasoline substitutes; future demands; shale-oil industry; shale-oil retorts.

Natural Gas. Natural-Gas Gasoline in 1921, E. G. Sievers. U. S. Geol. Survey, II-30, Jan. 25, 1923, pp. 237–252, 3 figs. Production; capacity of plants; growth of industry; problems in production of natural-gas gasoline; relations to supply of motor fuel; statistics by states.

Proper Utilization of Natural Gasoline, Lloyd F. Bayer. Soc. Automotive Engrs.—Jl., vol. 12, no. 3, Mar. 1923, pp. 273–275. Processes of extraction from natural gas; proper usage of natural gasoline in blended fuels as determined by lengthy series of tests.

Power-Producing Qualities. Preliminary Report of Power Producing Qualities of Certain Gasolines, Hugh M. Milton, Jr. Agricultural & Mech. College of Texas—Bul., vol. 8, no. 8, Aug. 1, 1922, 39 pp., 17 figs. Investigation of efficiency variations of four-cycle internal-combustion engine with different grades of petroleum products.

GASOLINE ENGINES

Marine. Tendencies in High-Speed Marine-Engine Design, J. G. Vincent. Soc. Automotive Engrs.—Jl., vol. 12, no. 3, Mar. 1923, pp. 257–262, 2 figs. General requirements; discusses need for light weight and points out that aircraft-engine design has established good precedent to follow, particularly with reference to crankshaft, connecting-rod, piston, cylinder and valve design; requirements in respect to cooling, lubrication, starting, idling, etc.

GEAR CUTTING

Blank Rim Supports. Gear Blank Rim Supports, Fred Horner. Machy. (Lond.), vol. 21, no. 542, Feb. 15, 1923, pp. 614–620, 34 figs. Methods of supporting and bracing blanks while cutting.

Spur and Helical Gears. Commercialised Gear Cutting (Spur and Helical Gears), T. A. Stoddart. Eng. Production, vol. 6, no. 122, Feb. 1, 1923, pp. 117–118. Fundamental points to be considered in producing gears; notes on cutters; hobbing method of production.

GEARS

Grinding. Grinding Bevel Gears True With Pitch Circle, Milton Wright. Am. Mach., vol. 58, no. 11, Mar. 15, 1923, pp. 399–400, 2 figs. Device; grinding for clamping and truing preliminary to grinding tips of teeth.

See also GRINDING MACHINES, Spiral Bevel Gear.

Maag. Maag Toothed Wheels (Maag-Zahnräder). Elektrotechnische Zeit., vol. 44, no. 5, Feb. 1, 1923, pp. 104–106, 9 figs. Describes new type of wheels made by Maag Company, Zurich, said to overcome disadvantages of other types for modern high-speed work; production and operation.

GRAIN ELEVATORS

Electrical Equipment. Electrical Equipment of C. & N. W. Grain Elevator, Jos. Andreucetti. Ry. Elec. Engr., vol. 14, no. 2, Feb. 1923, pp. 53–57, 12 figs. Dust-proof distribution panel cabinets, vapor-proof lighting units and all new conduit and wiring ensures reliable and safe operation.

GRINDING MACHINES

Internal. Redesign Grinding Machines to Increase Rate of Production. Automotive Industries, vol. 48, no. 9, Mar. 1, 1923, pp. 526–527, 2 figs. Heald Co. incorporates new idler with wider belts on grinding heads suitable for both old and new models with view to augmenting output.

Railway Shops. Grinding in the Railway Shops. Machy. (Lond.), vol. 21, nos. 540 and 541, Feb. 1 and 8, 1923, pp. 545–550 and 577–581, 22 figs. Machines and methods employed by British and American manufacturers in production and maintenance of locomotives and railway equipment.

Spiral Bevel Gear. Grinding Spiral Bevel Wheels. Machy. (Lond.), vol. 21, no. 542, Feb. 15, 1923, pp. 626–629, 11 figs. Machine developed by Reinecker Corp., Chemnitz, Germany, with which inaccuracies due to hardening are removed by grinding.

H

HANDLING MATERIALS

Foundries. Mechanical Appliances in the Foundry, G. F. Charnock. Foundry Trade Jl., vol. 27, no. 341, Mar. 1, 1923, pp. 171–177, 9 figs. Discusses question of transportation applied to jobbing as well as to specialized foundry from standpoint of mechanical engineer.

HARDNESS

Testing. Symposium on Hardness Testing Held at the Fourth Annual Convention of the Society, Detroit, October, 1922. Am. Soc. for Steel Treating—Trans., vol. 3, no. 5, Feb. 1923, pp. 480–501. Contains following articles, including discussions: Significance of Hardness Tests, H. P. Hollnagel; Testing of Metals for Hardness, H. M. German.

HEALTH

Industrial Plants. Health Problems of Industry, C. E. A. Winslow. Power Plant Eng., vol. 27, nos. 3, 4 and 5, Feb. 1, 15 and Mar. 1, 1923, pp. 186–188, 233–235 and 284–284, 3 figs. Health and efficiency in industrial plants. Feb. 1: Factory ventilation and lighting. Feb. 15: Industrial dust and its dangers; control of industrial poison hazards, sanitation in factory. Mar. 1: Fatigue and its factors; industrial medical service.

Promoting Health in Industry, C. E. A. Winslow. Iron Trade Rev., vol. 72, nos. 4, 5, 6, 7 and 8, Jan. 25, Feb. 1, 8, 15 and 22, 1923, pp. 298–299, 371–372, 440–441, 511 and 519, and 593 and 596. Deals with important problems as they affect industrial workers; consideration is given to best practice in eliminating hazards and providing protection. Jan. 25: Health, efficiency and medical service. Feb. 1: Factory ventilation and lighting. Feb. 8: Industrial dusts and poison hazards. Feb. 15: Sanitation in factory. Feb. 22: Fatigue and its factors.

HEAT PUMPS

Tests. Experiments With a Reciprocating Heat Pump at the Steam Laboratory of the Bavarian Revisionsverein (Versuche mit einer Kolbenwärmepumpe in der dampftechnischen Versuchsanstalt des Bayerischen Revisionsvereins). Zeit. des Bayer. Revisions-Vereins, vol. 27, nos. 2 and 3, Jan. 31 and Feb. 15, 1923, pp. 9–12 and 17–18, 2 figs. Determination of relation of heat absorption by steam and heat value of work performed; results of 15 experiments with saturated steam for vacuum, atmospheric presssure and one at excess pressure at 100, 120 and 140 r.p.m.

HEATING

Factories. Economical Factory Heating, Chas. F. Wade. Indus. Management (Lond.), vol. 9, no. 4, Feb. 22, 1923, pp. 99–110, 3 figs. Essential features of economical heating system in modern factory; most efficient methods of heat generation and distribution; fuel economy.

HEATING, STEAM

Central-Station. Electric Central Heating Plant and Heat Storage at Stavanger (Elektriske central-varmeanlaeg med magasinering i Stavanger), Chr. Grassdal. Elektroteknisk Tidsskrift, vol. 35, no. 36, Dec. 27, 1922, pp. 287–290, 6 figs. Due to high cost of fuel; details of equipment, production and consumption of current.

Radiator Ratings. Standard Ratings for Radiators, Boilers and Complete Installations, A. H. Barker. Domestic Eng. (British), vol. 42, no. 48, Dec. 1922, pp. 242–247. Difficulties of tests, such as determining amount of surface, maintaining uniform temperature, size of radiators for given duty, and similar difficulties in boiler tests.

HOBBING MACHINES

Automatic. Tangent Rack System of Gearing. Machy. (Lond.), vol. 21, no. 541, Feb. 8, 1923, pp. 603–605, 7 figs. Hotchkiss-Taylor automatic gear-generating machine.

HOISTS

Electric. An Induction Motor Operated Mine Hoists with Dynamic Braking, R. W. McNeill. Elec. Jl., vol. 20, no. 3, Mar. 1923, pp. 97–100, 8 figs. Hoist equipment installed at shaft of Lehigh Valley Co., near Shenandoah, Pa.

Pneumatic. Air-Driven Hoists Adaptable to All-Round Service, A. S. Taylor. Compressed Air Mag., vol. 28, no. 3, Mar. 1923, pp. 439–442, 10 figs. Services being performed by 20 "Little Tugger" hoists at Sun Shipbldg. Co., Chester, Pa.; description of hoists and their applications.

HYDRAULIC TURBINES

Draft Tubes. Notes on the Draught Tube of a Water Turbine, Otogorô Miyagi. Tôhoku Imperial University, Technology Reports, vol. 3, no. 1, 1922, pp. 57–69, 4 figs. Investigation of losses of energy; consideration of minimum loss and determination of best form of draft tube; numerical example.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

* Erie City Iron Works
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Springfield Boiler Co
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water, Metering
* H. S. B. W.-Cochrane Corp'n

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* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
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Hoisting Outfits
Novo Engine Co

Hoists, Air
* Ingersoll-Rand Co.
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* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n

Hoists, Electric
* Allis-Chalmers Mfg. Co
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.

Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.
Novo Engine Co.

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Locomotive & Coach
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Hoists, Mine
Lidgerwood Mfg.Co.
Novo Engine Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
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Hoists, Steam
(See Engines, Hoisting)

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Curtis & Curtis Co.

Hose, Acid
United States Rubber Co.

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* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Fire
United States Rubber Co.

Hose, Gas
United States Rubber Co.

Hose, Gasoline
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Metal, Flexible
* Johns-Manville (Inc.)

Hose, Oil
United States Rubber Co.

Hose, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Steam
United States Rubber Co.

Hose, Suction
United States Rubber Co.

Humidifiers
* American Blower Co.
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* American Blower Co.
* Carrier Engineering Corp'n

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Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.)
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* Worthington Pump & Machinery Corp'n

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* Allis-Chalmers Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

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American Fluid Motors Co.

Hydrokineters
* Schutte & Koerting Co.

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Taylor Instrument Cos.

Hygrometers
Taylor Instrument Cos.

Ice Making Machinery
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Ice Tools
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Indicators, CO_2
Bacharach Industrial Instrument Co.
* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.

Indicators, Engine
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
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Midwest Steel & Supply Co.

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* General Electric Co.
Taylor Instrument Cos.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

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* Bacharach Industrial Instrument Co.
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Bristol Co.
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Dietzgen, Eugene Co.
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* Quigley Furnace Specialties Co.

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* Crane Co.
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* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

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* Barco Mfg. Co.

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* Barco Mfg. Co.
* Lunkenheimer Co.

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Manufacturing Equipment & Engrg. Co.

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* Jones & Lamson Machine Co.

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Lathes, Chucking
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Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

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* Gwilliam Co.

Linings, Brake
* Johns-Manville (Inc.)

Linings, Furnace
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* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
McLeod & Henry Co.
* Quigley Furnace Specialties Co.

Linings, Stack
* Johns-Manville (Inc.)

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* Gifford-Wood Co.
Link-Belt Co.

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* General Electric Co.
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(Richardson-Phenix Division)
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* Bowser, S. F. & Co. (Inc.)
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American Fluid Motors Co.

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Johnson, Carlyle Machine Co.
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Mechanical Stokers
(See Stokers)

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* Hendrick Mfg. Co.

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Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Precision Instrument Co. (Inc.)
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
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(Richardson-Phenix Division)
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* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Impulse. The Tangential Impulse Water Wheel, Ely C. Hutchinson. Elec. Jl., vol. 20, nos. 2 and 3, Feb. and Mar. 1923, pp. 49–51 and 82–86, 15 figs. Efficiency and general design; buckets and wheel centers; speed regulation; plain and needle, and deflecting nozzles; jet deflectors; auxiliary relief needle nozzles; multiple nozzle wheels; coupled and overhung wheels; bearings and governors.

Small-Plant. Typical Water Turbines for Small Plants, S. C. O'Grady. Beama, vol. 12, no. 58, Feb. 1923, pp. 96–104, 11 figs. Casing turbines.

Types. Development in Hydraulic Machinery During the Last Decade (Die Bedeutung des letzten Dezenniums fur den Wasserkraftmaschinenbau), Hans Baudisch. Elektrotechnik u. Maschinenbau, vol. 41, no. 1, Jan. 1, 1923, pp. 14–16. Discusses Francis, Kaplan, and other turbines,—their operation and regulation.

HYDROELECTRIC DEVELOPMENTS

Bavaria. The Lake Walchen and the Bavarian Hydroelectric Development (Das Walchensee- und Bayernwerk), E. Mattern. Zeit. des Vereines deutscher Ingenieure, vol. 67, nos. 1, 2 and 4, Jan. 6, 13 and 27, 1923, pp. 1–6, 36–39 and 77–80, 35 figs. General arrangement of entire development; description of separate installations, including canals, galleries, reservoir, pipe lines and power house and machinery; utilization of water power, costs and construction details; economic importance of two Bavarian developments.

Canada. Hydro-Electric Power Development on the Metis River, P. Q. Contract Rec., vol. 37, no. 5, Jan. 31, 1923, pp. 100–103, 4 figs. Lower St. Lawrence Power Co. making use of Grand Metis Falls for plant of 3500-hp. initial capacity; ultimate capacity 7000 hp.; special features of project.

New Power Development at Chicoutimi. Contract Rec., vol. 37, no. 7, Feb. 14, 1923, pp. 158–160, 1 fig. Preliminary details of plant to be built on Chicoutimi River for Price Bros. Nature of site and factors entering into design of development. See also Contract Rec., vol. 37, no. 8, Feb. 21, 1923, pp. 178–179, 1 fig. Information on storage dams.

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Pressure-Reducing Device, Automatic. Device for Eliminating Ram Thrusts and Excess Pressure in Pressure Piping (Dispositif pour la suppression des coups de belier et des surpressions dans les conduites de refoulement), E. Maynard. Revue Générale de l'Electricité, vol. 13, no. 6, Feb. 10, 1923, pp. 211–213, 4 figs. Describes automatic device for hydroelectric power plants; examples of application.

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[See also COST ACCOUNTING; TIME STUDY.]

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[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; GASOLINE ENGINES; OIL ENGINES.]

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Chilled. Chilled Castings. Eng. Production, vol. 6, no. 124, Feb. 15, 1923, p. 165. Notes on composition of mixtures and care of molds.

Cupola Mixtures. Modern Methods for Making Cupola Mixtures, H. L. Campbell. Chem. & Met. Eng., vol. 28, no. 11, Mar. 14, 1923, pp. 492-495, 4 figs. Diagrams useful to determine amounts of available pig iron to weigh into mixture in order to secure castings of required composition; silicon and manganese may both be easily predetermined if three piles of pig iron are in yard.

Pouring Temperatures. Study Pouring Temperatures, S. J. Felton. Foundry, vol. 51, no. 4, Feb. 15, 1923, pp. 138-140, 4 figs. Outline of heat loss of iron as it flows from cupola to mixing ladle and is transferred to pouring ladles; quick pouring essential for small steel castings.

Test Bars. Test-Bars. Foundry Trade Jl., vol. 27, no. 340, Feb. 22, 1923, pp. 151-155, 6 figs. Definition; utility; cause of hard castings; graphitization; size and number of test bars necessary; overcoming undercooling; use of porosity bars. Micrographs.

Tunnel Linings. Making Castings for Hudson River Tunnel. Iron Age, vol. 111, no. 10, Mar. 8, 1923, pp. 663-667, 10 figs. Quantity production on interchangeable basis; adaptation of armor-plate planer for milling; simplified foundry operations.

IRON, PIG

Costs. Foreign and Domestic Pig Iron Cost, Paul M. Tyler. Iron Age, vol. 111, nos. 7, 8 and 9, Feb. 15, 22 and Mar. 1, 1923, pp. 467-470, 533-536 and 605-606, 1 fig. Disadvantageous position of United States in export market; prewar and present analyses for British, Lorraine and Belgian furnaces. Export trade in light of iron costs; how item of freight rates works to check aggressive drives for world iron and steel business.

Sand-Cast vs. Machine-Cast. Comparison of Sand Cast and Machine Cast Pig Iron, S. B. Phelps. Blast Furnace & Steel Plant, vol. 11, no. 3, Mar. 1923, pp. 196-197. Economic effects; melting and spout temperatures; differences in melting conditions.

Steadite. A Controversial Constituent in Gray Pig Iron (Sopra un costituente di natura controversa esistente nelle ghise grigie), Vincenzo Prever. Ingegneria, vol. 2, no. 1, Jan. 1, 1923, pp. 2-8, 9 figs. Discusses steadite, a binary eutectic of Fe_3P and Fe, a constituent very similar to ferrite and cementite; micrographs and analyses of various samples.

Synthetic. Synthetic Pig Iron (Les Fontes Synthetiques), Marcel Didier. Fonderie Moderne, no. 12, Dec. 1922, pp. 339-341. Produced by melting mixture of steel turnings with coal, coal acting as fuel, reduction agent and carburization agent.

J

JIGS

Design. Jigs and Tools, J. Moore. Eng. Production, vol. 6, no. 121, Jan. 25, 1923, pp. 74-79, 16 figs. Considerations in regard to design. Discussion of paper, Eng. Production, vol. 6, no. 122, Feb. 1, 1923, pp. 102-104.

Rotating Indexing. Rotating Indexing Jigs Reduce Labor Cost in Engine Manufacture, J. Edward Schipper. Automotive Industries, vol. 48, no. 11, Mar. 15, 1923, pp. 612-615, 12 figs. One man operates 3 to 5 machines in production of General Motors truck engine. Describes method which is said to be particularly effective and economical where production is not always up to capacity.

L

LABOR

Lumber Manufacturing. Wages and Hours of Labor in Lumber Manufacturing—1921. U. S. Bur. Labor Statistics Bul. No. 317, Jan. 1923, 55 pp. Tables giving rates of wages per hour, hours of labor per week, and full-time weekly earnings, for both sawmill and logging branches.

LABOR TURNOVER

Study of. Need for Cooperative Research in an Industrial Community, Joseph H. Willits. Engrs. & Eng., vol. 39, no. 12, Dec. 1922, pp. 403-408, 6 figs. Study of turnover of labor; includes charts showing turnover percentage.

LABORATORIES

General Electric Co., England. Research Laboratories at Wembly. Engineer, vol. 135, no. 3505, Mar. 2, 1923, pp. 228-229, 10 figs. partly on p. 232. Layout and equipment of laboratories of Gen. Elec. Co. which are most elaborate and extensive connected with electrical manufacture in England. See also Engineering, vol. 115, no. 2983, Mar. 2, 1923, pp. 256-258, 13 figs. partly on supp. plates.

LATHES

Standardization. Standardizing Threaded Spindle Heads (Die Normung der Spindelköpfe mit Gewinde), G. Schlesinger. Werkstattstechnik, vol. 17, no. 2, Jan. 15, 1923, pp. 33-37, 11 figs. Work of special committee of German Union of Machine Tool Manufacturers to standardize mandrel noses for lathes, thread, pitch, etc.

Vertical. The Vertical Lathe (Le tour vertical), André Sthégens. Ouvrier Moderne, vol. 5, no. 11, Feb. 1923, pp. 447-452, 13 figs. Advantages, recent developments, design and operation.

LIGNITE

Carbonization. Report of Lignite Carbonizing Experiments Conducted at Grand Forks in 1922. U. S. Bur. of Mines, Reports of Investigations, no. 2441, Feb. 1923, 26 pp., 4 figs. Lignite carbonizer was devised which is simple in construction and operation; may be operated intermittently without serious damage; estimated cost and tentative layout of plant of definite capacity; costs of lignite char and briquets made from lignite and binder of various prices.

Drying and Briquetting. Brown Coals and Lignites, William A. Bone. Roy. Soc. Arts—Jl., vol. 71, nos. 3663 and 3664, Feb. 2 and 9, 1923, pp. 189-199 and 208-216, 10 figs. Feb. 2: Drying of brown coals; heat treatment at temperatures below 400 deg. cent. as possible method of enhancing their fuel values; briquetting of brown coals and lignites. Feb. 9: Their thermal decomposition and carbonization at different temperatures.

Saskatchewan, Can. The Lignites of Saskatchewan, R. J. Lee. Can. Inst. Min. & Metallurgy—Monthly Bul., no. 131, Mar. 1923, pp. 62-74, 7 figs. Coal areas; development; utilization; lignite reserves; nature of lignite.

LOCOMOTIVE BOILERS

Tests. Locomotive Boilers (Etude experimentale de la chaudière locomotive), Paul Conte. Revue Générale des Chemins de Fer et des Tramways, vol. 42, nos. 1 and 2, Jan. and Feb. 1923, pp. 43-59 and 125-144, 19 figs. Comparison of results of French laboratory studies and those of Pennsylvania Railroad at Altoona, covering heat balance, combustion, increased grate surface, absorption of heat developed by combustion, superheaters, dampers and drafts.

LOCOMOTIVES

Boosters. New Booster Suspension and Locomotive Trailing Truck. Ry. Rev., vol. 72, no. 5, Feb. 3, 1923, pp. 205-209, 5 figs. Main features of new C-S design are said to be lightness, accessibility and adaptability.

Bureau of Locomotive Inspection. Report of the Bureau of Locomotive Inspection. Boiler Maker, vol. 23, no. 2, Feb. 1923, pp. 42-46, 8 figs. Abstracts of report as presented by A. G. Pack, covering all defects on all parts and appurtenances of locomotive and tender including boiler reported, together with all accidents reported, caused by failure of some part or appurtenance of locomotive or tender, including boiler. Marked decrease in number of accidents and fatalities from failure of locomotives.

Coaling Stations. Reinforced Concrete Coaling Plant at Michigan City, Ind. Ry. Rev., vol. 72, no. 5, Feb. 3, 1923, pp. 214-218, 8 figs. Latest-type 500-ton automatic electric station, constructed for Mich. Central R. R.; novel feature is curved runway for elevating bucket; sand-drying plant is also included.

Consolidation. Powerful Consolidation Locomotive for the L. & N. E. Boiler Maker, vol. 23, no. 2, Feb. 1923, p. 39, 1 fig. 2-8-0 locomotive for Lehigh & New England, weighing 301,500 lb. with 279,000 lb. on drivers; rated boiler capacity 2420 hp.

Diesel-Engine. Are We Due for a Radical Change in Locomotive Construction? A. F. Stuebing. N. Y. R. R. Club, Official Proc., vol. 33, no. 3, Jan. 19, 1923, pp. 6930-6935. Discusses electric and turbine locomotives and application of Diesel engine to locomotive service.

Possibilities of the Diesel Engine, Elmer A. Sperry. New York R. R. Club Official Proc., vol. 33, no. 3, Jan. 19, 1923, pp. 6938-6941 and (discussion by W. E. Symons) 6942-6945. Problems and advantages.

Electric. See ELECTRIC LOCOMOTIVES.

4-6-0. New 4-6-0 Type Goods Engines for the Bombay, Baroda & Central India Railway. Ry. Gaz., vol. 38, no. 5, Feb. 2, 1923, pp. 156-157, 2 figs. Indian-built locomotives for meter-gage lines.

Freight. The Russian E Superheater Freight Locomotives and Their Tests (Die Russische E-Heifsdampf-Güter-Locomotive und ihre Erprobung), F. Meineke. Organ für die Fortschritte des Eisenbahnwesens, vol. 77, no. 24, Dec. 15, 1922, pp. 329-332, 2 figs. Details of new German and Swedish built locomotives; tractive effort 20,165 kg.; details of trial runs between Petersburg and Moscow.

Garratt Passenger. New Heavy "Garratt" Locomotives for South Africa. Ry. Gaz., vol. 38, no. 7, Feb. 16, 1923, p. 236, 1 fig. Particulars of 2-6-2 locomotives designed for main-line passenger trains.

Inspection. Report of the Bureau of Locomotive Inspection (to Interstate Commerce Commission). Ry. Age, vol. 74, no. 8, Feb. 24, 1923, pp. 473-474, 4 figs. Increasing number of locomotives inspected; smaller number of defects and 15 per cent fewer accidents.

Reconstruction. Rebuilt Four-Cylinder Locomotive, London Midland & Scottish Railway (Glasgow & South Western Section). Ry. Gaz., vol. 38, no. 6, Feb. 9, 1923, pp. 190-191, 4 figs. Shows diagrams and photographs of engine as originally built 26 years ago and as recently turned out from Kilmarnock Works, after rebuilding.

Setting Slide Valves. A Method of Setting Locomotive Slide Valves, H. G. Pottle. Roy. Engrs. Jl., vol. 37, no. 1, Mar. 1923, pp. 24-30, 6 figs. Method of setting valves of twin inside-cylindered locomotive, fitted with ordinary "D" slide valves and Stephenson's link motion.

Steam, Advantages of. Reliability and Dependability of Steam, James G. Dudley. New York R. R. Club Official Proc., vol. 33, no. 3, Jan. 19, 1923, pp. 6945-6948 and (discussion) 6948-6952. Writer points out prime essentials in favor of steam as proper locomotive power, namely, absolute reliability and dependability of steam and necessity of heating trains.

Tractive Force. Maximum Speed at Which Rated Tractive Force Can be Developed, Edward L. Coster. Ry. Mech. Engr., vol. 97, no. 3, Mar. 1923, pp. 150-151. Examination of article by L. R. Pomeroy entitled Curves of Locomotive Operation, published in Am. Engr., Feb. 1923, based on which recalculation of constants and their extention to include higher degree of superheat has been made.

2-10-0. Powerful 2-10-0 Type Three-Cylinder Freight Locomotive, Prussian State Railways. Ry. Gaz., vol. 38, no. 6, Feb. 9, 1923, pp. 192 and 194, 2 figs. One of latest post-war developments in German locomotive practice, built by Hanover Machine Works Co.

Variable Transmissions. Locomotives With Variable Transmissions (Lokomotive mit veränderlicher Uebersetzung), Wittfeld. Glasers Annalen, vol. 92, no. 1, Jan. 1, 1923, pp. 2-5, 8 figs. Proposes three cylinders in place of four and shows advantages in operation.

LUBRICATING OILS

Research. Stability of a Viscous Liquid contained between Two Rotating Cylinders, G. I. Taylor. Royal Soc.—Proc., vol. 102, no. A 718, Feb. 1, 1923, pp. 541-542. Abstract giving results of mathematical investigation and numerical verification, of stability for symmetrical disturbances of a viscous fluid in steady motion between concentric rotating cylinders.

LUMBER

Hardwood Industry, Waste in. The Needless Hardwood Lumber Waste, Frederick F. Murray. Soc. Automotive Engrs.—Jl., vol. 12, no. 1, Jan. 1923, pp. 95-99, 2 figs. Problem of standardization and waste elimination in hardwood industry from tree through factory; necessity for revised grading specifications.

M

MACHINE DESIGN

Resonance System. Application of the Principle of Resonance to Mechanics (Die Anwendung des Resonanzprinzips auf die Mechanik), Hans Bourquin. Elektrotechnischer Anzeiger, vol. 40, nos. 22 and 23, Feb. 7 and 8, 1923, pp. 165-166 and 171-172. Machine parts moving to and fro are developed as an oscillating system; energy is transmitted to them by elastic couplings.

MACHINE-TOOL INDUSTRY

Economic Features. Economic Features of the Machine-Tool Industry, Ernest F. Dubrul. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 151-153 and 200. Features brought out as result of analyzing statistics of 1919 census of manufacturers; problems of management; trade evils and their remedies.

MACHINE TOOLS

Development. The Development of Machine Tools, Dexter S. Kimball. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 154 and 168. Outstanding names in machine-tool history.

Indicator, Dial Traverse. The "Instanter" Dial Traverse Indicator. Machy. (Lond.), vol. 21, no. 544, 1, 1923, pp. 682-685, 13 figs. Automatic measuring device applicable to all types of machine tools, supplied by H. W. Kearns & Co., Broadheath.

MACHINERY

Foundation Vibrations. Experimental Investigation of Vibration-Damping Foundations for Machinery (Experimentelle Untersuchung von schwingungsdämpfenden Unterlagen für Maschinen), Ernst Schmidt. Gesundheits-Ingenieur, vol. 46, no. 6, Feb. 10, 1923, pp. 61-71, 29 figs. Investigation of behavior of elastic machine foundations of cork, rubber, etc.; experimental results. Address before Tech. Acad. of Munich.

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Alphabetical List on page 138

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American Fluid Motors Co.

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* Wheeler, C. H. Mfg. Co.
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* Allis-Chalmers Mfg. Co.
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Pumps, Sump
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Buffalo Steam Pump Co.
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(See Governors, Pump)

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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

MAGNESIUM ALLOYS

Electron Metal. Progress and Prospects in the Use of Light Metals (Fortschritte und Aussichten in der Verwendung der Leichtmetalle), Felix Thomas. Maschinenbau, vol. 2, no. 8, Jan. 26, 1923, pp. G85-G87. Magnesium and its alloys; electron metal, most important magnesium alloy, and its use in automobile, aircraft, machine and electrical industry, as substitute for horn, galalith, bone, celluloid, etc.; for production of useful and luxury products, toys, etc.

MALLEABLE CASTINGS

Handling in Process. Handling Malleable Castings in Process, F. L. Prentiss. Iron Age, vol. 111, no. 9, Mar. 1, 1923, pp. 591-594, 5 figs. Plant designed for saving labor in operation uses standardized 3-wheel trucks; pulverized fuel gives further economies in production cost. Practice of Maumee Malleable Castings Co., Toledo, Ohio.

MALLEABLE IRON

Deterioration through Galvanizing. Deterioration of Malleable in the Hot-dip Galvanizing Process, W. R. Bean. Am. Inst. Min. & Met. Engrs.—Trans., no. 1214-S, Feb. 1923, 28 pp., 20 figs.; and (abstract) in Min. & Metallurgy, vol. 4, no. 194, Feb., pp. 86-87, 1 fig. Deterioration is found to be intimately connected with phosphorus and silicon contents of iron; in general, low-phosphorus (under 0.15 per cent) low-silicon (under 0.80 per cent) irons will withstand process best and show practically no deterioration.

Manufacture Direct From Ore. The Old Swedish Osmond Process (Den gamla svenska osmundtillverkningen), Alf Grabe. Jernkontorets Annaler, vol. 107, Special No., May 31, 1922, pp. 5-61, 16 figs. Process for direct conversion of ore into malleable; ore deposits, roasting, furnace construction, smelting, etc.

METALS

Behavior under Stress. The Behavior of Metals under Repeated Stress (Das Verhalten der Metalle bei wiederholter Beanspruchung), P. Ludwik and R. Scheu. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 6, Feb. 10, 1923, pp. 122-126, 16 figs. Torsion, bending and impact duration tests with aluminum, copper and low-carbon steel; influence of hardness, and mechanical and thermal treatment on durability; deformation diagrams of fatigued metals; structural changes.

Compressibility. The Compressibility of Thirty Metals as a Function of Pressure and Temperature, P. W. Bridgman. Am. Acad. Arts & Sci.—Proc., vol. 58, no. 5, Jan. 1923, pp. 165-242, 3 figs. Absolute compressibility of iron; compressibility of metals other than iron; results and theoretical considerations.

Fatigue. Fatigue of Metals, C. E. Stromeyer. S. Wales Inst. Engrs., excerpt from Proc., vol. 38, no. 3, read before meeting May 25, 1922, pp. 285-308 and (discussion) 308-331, 2 figs. Results of tests on mild steel, only ones ever made for determination of fatigue limits of permanently stressed samples.

Research. Scientific Bases for Research in Pure Metals (Die wissenschaftlichen Grundlagen der Edelmetallforschung), R. Vogel. Zeit. fur angewandte Chemie, vol. 35, no. 101, Dec. 19, 1922, pp. 705-708, 13 figs. Microscopic structure of metals; physico-chemical relations of metals on alloying; equilibrium, solidification and cooling curves.

Structure. The Structure and Related Properties of Metals, Henry S. Rawdon. Am. Soc. for Steel Treating—Trans., vol. 3, no. 6, Mar. 1923, pp. 649-679, 33 figs. Discusses ferrous and non-ferrous alloys. Structure of metals: macrostructure, conditions affecting structure, chemical composition, temperature, grain growth, etc. Effects of structure of alloys upon their properties. Applications of microscopy of metals; relations of microscopy to heat treatment; examples of deterioration of metals and alloys in service. Photomicrographs.

Temperatures, Physical-Change. Temperatures at Which Physical Changes Occur. Iron Age, vol. 110, no. 23, Dec. 7, 1922, pp. 1492-1493. Fusion, melting and vaporization of metals and other substances. Table of temperatures for producers and users of iron and steel.

MILLING CUTTERS

Design. Effect of Variations in Design of Milling Cutters On Power Requirements and Capacity, Benjamin P. Graves and James A. Hall. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 155-158 and 205, 10 figs. Study of effect of changes in number of teeth, spiral angle, rake angle, and cutting speed of cutter on power consumption, tendency to chatter, and stresses set up in machine.

MILLING MACHINES

Automatic. New Automatic Manufacturing Type Milling Machine. Machy. (N. Y.), vol. 29, no. 7, Mar. 1923, pp. 519-522, 8 figs. Machine brought out by Brown & Sharpe Mfg. Co. for automatic milling of duplicate parts in large quantities, unique feature of which is automatic control of spindle and table by means of dogs located at rear and front of table.

Electric Drive. Individual Drive of Milling Machines (Einzelantriebe von Fräsmaschinen), Karl Meller. Siemens-Zeit., vol. 2, no. 12, Dec. 1922, pp. 659-665, 8 figs. Examples are given showing advance in design of such drives in last 25 years; for large milling machines, multimotor drive is advocated, so that cutter is driven by main motor and feeding device by second smaller motor.

MOLDING MACHINES

Characteristics. Moulding Machines. Eng. Production, vol. 6, no. 124, Feb. 15, 1923, p. 163, 1 fig. Some observations on their characteristics.

MOLDING METHODS

European vs. American. Compares Molding Practices, E. Ronceray. Foundry, vol. 51, no. 4, Feb. 15, 1923, pp. 131-135, 7 figs. European vs. American molding machines; points of difference; hydraulic equipment is shown to have advantages and disadvantages over compressed-air operation. Paper read before Am. Foundrymen's Assn.

Machine Molding. Machine Moulding Methods, T. F. Hardyman. Eng. Production, vol. 6, no. 126, Mar. 1923, pp. 194-198, 20 figs. Describes method of molding by different machines; recommends hydraulic machines for intensive production, and jarring machine in foundry where machine molding is done spasmodically on small batches of castings.

Stoney Process. Intensive Production by the Stoney Process. Can. Foundryman, vol. 14, no. 1, Jan. 1923, pp. 18-19, 3 figs. Describes layout for production of Chevrolet cylinders at plant of Ferro Machine & Foundry Co., Cleveland, Ohio; 500 cylinders made per day with only 28 flasks and one pair of machines; steel flasks used.

MOTOR TRUCKS

Electric. American Electric Truck Specifications. Automotive Industries, vol. 48, no. 8, Feb. 22, 1923, pp. 434-435.

Electric vs. Gasoline. Electric Trucks, their Technical and Economic Efficiency (Ueber die betriebstechnische und wirtschaftliche Eignung der Elektrolastwagen), Schneider. Motor u. Auto, vol. 20, no. 3, Feb. 10, 1923, pp. 11-16, 3 figs. Advantages and drawbacks; competition between electric and gasoline trucks, their proper sphere of action; comparative cost data.

European Specifications. British and Continental Truck Design. Automotive Industries, vol. 48, no. 8, Feb. 22, 1923, pp. 420-427. European gasoline truck chassis specifications.

German High-Speed. High-Speed Motor Trucks (Schnellastwagen), G. Becker. Motorwagen, vol. 26, nos. 2 and 3, Jan. 20 and 31, 1923, pp. 18-24 and 33-35, 13 figs. Design of Daag motor truck; dimensions and weights of separate parts; test results; fuel consumption; wheel tires; trial run.

Overloading. Over-Loading of Motor Trucks, David C. Fenner. Soc. Automotive Engrs.—Jl., vol. 12, no. 2, Feb. 1923, p. 210. Presented at joint session of Nat. Highway Traffic Assn. and Mich. State Good Roads Assn.

Causes and Prevention of Overloads, David C. Fenner. Power Wagon, vol. 30, no. 218, Jan. 1923, pp. 27-28.

Types. Public Service Motor Vehicles. Surveyor, vol. 63, no. 1619, Jan. 26, 1923, pp. 127-130, 9 figs. Review of development in England during 1922, including Karrier vehicles, gasoline-electric buses, tipping wagons and gritters, convertible cesspool emptier and three-way tipper, electric and steam vehicles.

N

NATURAL GAS

Central-Station Fuel. Natural Gas as a Fuel for Central Stations, E. A. Quinn. Elec. World, vol. 81, no. 10, Mar. 10, 1923, pp. 575-577, 6 figs. Unusually high efficiency in burning natural gas said to have been developed with new type of burner; long life of burner and boiler settings are assured with this equipment.

O

OIL ENGINES

Central-Station. Oil Engines for Central Stations, M. S. Mason. Elec. Rev., vol. 92, no. 2360, Feb. 16, 1923, pp. 244-245. Suggestions for operation.

Exhaust Noise. Exhaust Noise of Oil Engines, Hiram Percy Maxim. Oil Engine Power, vol. 1, no. 2, Feb. 1923, pp. 70-72, 3 figs. What noise is, especially that noise encountered in an oil-engine exhaust; shows that the conception that if gases are expended to a low pressure they will be sluggish and if they are sluggish they will enter atmosphere slowly and be silent, may be wrong.

Fairbanks-Morse "Y." Oil Engines for Mines. Can. Min. Jl., vol. 44, no. 6, Feb. 9, 1923, pp. 113-115, 4 figs. Describes Fairbanks-Morse "Y" type, made in sizes 10 to 25 hp. in horizontal type and 37½ to 300 hp. in vertical type; principle of operation; tests and guarantees.

German Developments. German Oil-Engine Developments. Power, vol. 56, no. 23, Dec. 5, 1922, pp. 878-879. The Deutz solid-injection engine; German export policy. Interview with Franz Schultz, director and chief engineer of The Deutz Co.

Ripert. Ripert Motor with Steam Chamber in Head, M. Grison. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 186-187, 1 fig. Summary of conditions which, if satisfied, it is claimed, would improve Diesel engine when operating on heavy oils and, in particular, would make it more flexible. Ripert oil engine is designed to meet these requirements. Translated from Bul. Technique du Bur. Veritas, vol. 4, no. 10, Oct. 1922, p. 245.

Six-Cylinder Two-Stroke. A Six-Cylinder Oil Engine. Engineer, vol. 135, no. 3503, Feb. 16, 1923, pp. 180-181, 6 figs. partly on p. 176. Two-stroke engine built by Plenty & Son, Newbury, for installation in station of Farnham Gas & Elec. Light Co.; engine, which is 300-b.hp. will have to work in parallel with existing Diesel-driven alternators.

OIL FUEL

Production. Liquid Fuel Congress (Le Congrès des Combustibles liquides), P. Mallet. Journal des Usines à Gaz, vol. 46, nos. 22 and 23, Nov. 20 and Dec. 5, 1922, pp. 337-339 and 353-360. Transformation of heavy into light hydrocarbons; shales and lignites; low-temperature distillation.

OPEN-HEARTH FURNACES

Basic. Efficiency of the Basic Open-Hearth Process, J. T. Wright. Iron & Coal Trades Rev., vol. 106, no. 2867, Feb. 9, 1923, pp. 183-184. Notes on manufacture of producer gas; use of waste gases from blast-furnace gas-fired boilers, etc.; comparison of steam-air producer gas and waste gas-air gas; various types of gases used in open hearth; effect of excess air upon flame temperature; conservation of heat in regenerators; slag. (Abstract.) Paper read before Cleveland Instn. Engrs.

Coke-Oven-Gas-Burning. Using Coke-Oven Gas in Martin Furnaces (Sur l'utilisation du gaz de fours a coke dans les fours Martin), Jean Dupuis. Revue Universelle des Mines, vol. 16, no. 3, Feb. 1, 1923, pp. 201-216. Laboratory tests made, including heat balance.

Materials for. Materials Used in the Construction of Martin Furnaces (Les materiaux employés dans la construction des Fours Martin). Métallurgie, vol. 54, no. 6, Feb. 8, 1923, pp. 207-209. Acid and basic linings; furnace beds; properties of silica, magnesia and cromite bricks.

OSCILLATIONS

Mechanical. Mechanical and Electromechanical Oscillations (Ueber mechanische und elektro-mechanische Schwingungen), Heinrich Schieferstein. Zeit. fur technische Physik, vol. 3, no. 12, 1922, pp. 377-380, 11 figs. Means and ways of improving useful effect of reciprocating mechanisms in order to render them at least as effective as rotating mechanisms.

OXY-ACETYLENE CUTTING

Cutting Machines. Cutting Plates With Blow Pipes (Le découpage de la tôle par le chalumeau), E. Weiss. Nature, no. 2547, Jan. 27, 1923, pp. 60-62, 5 figs. Describes radiograph and camograph, apparatus for oxy-acetylene cutting of plates along definite line or curve.

Forged Steel. Investigation of the Effect of Torch Cutting Forged Steel, J. R. Dawson. Acetylene Jl., vol. 24, no. 8, Feb. 1923, pp. 375-379, 16 figs. Results of investigation, dealing with methods for torch cutting of forgings, structural changes resulting from cutting, torch cutting red-hot steel; economies obtained by oxy-acetylene cutting.

Manganese Steel. Cutting Manganese Steel, Z. T. Davis. Am. Welding Soc.—Jl., vol. 1, no. 10, Oct. 1922, pp. 34-37, 6 figs. Discusses oxy-acetylene cutting in connection with production of manganese steel castings.

OXY-ACETYLENE WELDING

Cast Iron, Bibliography. Oxy-Acetylene Welding of Cast Iron—Bibliography. Am. Welding Soc.—Jl., vol. 1, no. 10, Oct. 1922, p. 46. Books.

Pressure Vessels. Unfired Pressure Vessels, S. W. Miller. Am. Welding Soc.—Jl., vol. 1, no. 10, Oct. 1922, pp. 47-53. Welding of tanks; facts regarding proposed A.S.M.E. code, and provisions of this code as they relate to welding; necessity of a code and for only one code.

P

PATTERNS

Electric Heating of. Heats Patterns Electrically, C. A. Cremer. Foundry, vol. 51, no. 4, Feb. 15, 1923, pp. 141-143, 3 figs. Claim is advanced that electric heaters have numerous advantages over gas and oil heaters and cost is favorable in comparison with other methods. Paper presented before Am. Foundrymen's Assn.

PIPE BENDS

Elasticity. The Elasticity of Pipe Bends, Sabin Crocker and S. S. Sanford. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 159-164, 9 figs. Mathematical formulas are developed connecting deflection of different types of pipe bends with force producing deflection, and also expressing stress set up as function of observed deflection and constants of bend. Experiments made to check force vs. displacement; charts for use in selecting proper size and shape of bends to take care of given expansion; and to determine force exerted by bend when in given state of deflection.

PISTON RINGS

Standard Dimensions. British Standard Dimensions for Wide Type Concentric Piston Rings for Automobiles. Brit. Eng. Standards Assn., no. 5003, Dec. 1922, 7 pp.

PLANERS

Attachments. Planer and Shaper Attachments, Edward K. Hammond. Machy. (N. Y.), vol. 29, no. 7, Mar. 1923, pp. 531-535, 13 figs. Special equipments that adapt planers and shapers for performing unusual operations.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

Lammert & Mann Co.
Mackintosh-Hemphill Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* Cleveland Worm & Gear Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Poole Engrg. & Mch. Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

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* Fuller-Lehigh Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works

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* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Specialties
* Crane Co.
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* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const Co.
* Sarco Co. (Inc.)

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* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.

Steel, Cold Rolled
Cumberland Steel Co.
* Union Drawn Steel Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Falk Corporation
* Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
* Union Drawn Steel Co.

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* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
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* Keeler, E. Co.
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* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

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* Vogt, Henry Machine Co.

Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

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* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
Green Engineering Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Hand Operated
* McClave-Brooks Co.

Stokers, Overfeed
* Detroit Stoker Co.
* McClave-Brooks Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
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* Walsh & Weidner Boiler Co.

Sugar Machinery
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* Walsh & Weidner Boiler Co.

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* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Switches, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Synchronous Converters
(See Converters, Synchronous)

Synchroscopes
Weston Electrical Instrument Co.

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Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Tachometers
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
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Tachoscopes
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Tanks, Acid
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
* Graver Corp'n
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

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(See Regulators, Temperature)

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Taylor Instrument Cos.

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* Bailey Meter Co.
Taylor Instrument Cos.

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* Bristol Co.
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* Powers Regulator Co.

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* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

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* Landis Machine Co. (Inc.)

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Link-Belt Co.

Tongs, Crane
Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
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Tools, Machinists' Small
* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

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DuPont Engineering Co.

Torches, Hand
* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tractors, Turntable
Whiting Corp'n

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

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Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
Whiting Corp'n

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* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Transmissions, Variable Speed
American Fluid Motors Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

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* Crane Co.
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Reading Chain & Block Corp'n
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* Wheeler Condenser & Engrg. Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Tubing, Rubber (Hard)
* Goodrich, B. F. Rubber Co.

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Smith, S. Morgan Co.
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* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
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Turbo-Blowers
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Turbo-Compressors
* Ingersoll-Rand Co.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Electric & Mfg. Co.

Turbo-Pumps
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Drives. Planer Drives, Albert Clegg. Machy. (Lond.), vol. 21, no. 541, Feb. 8, 1923, pp. 586–591, 6 figs. Characteristics of various types; Buckton spiral-geared planers.

PNEUMATIC TOOLS

Power Hammers. Single-Blow Pneumatic Power Hammers. Ry. Gaz., vol. 38, no. 5, Feb. 2, 1923, p. 155, 2 figs. Describes new design introduced by B. & S. Massey, Ltd., Manchester.

PRODUCER GAS

Production and Use. The Production and Use of Producer Gas (Streifzüge durch das Gebiet der Erzeugung und Verwendung von Generatorgas), Hubert Hermanns. Wärme, vol. 45, nos. 32, 34, 36, 37 and 39, Aug. 18, Sept. 1, 15, 22 and Oct. 6, 1922, pp. 389–392, 413–416, 439–442, 454–457 and 477–479, 56 figs. Discusses new types of gateless producers, stationary- and traveling-grate producers; charging arrangements, gas-purification plants, low-temperature-tar recovery plants, gas burners, gas-heated metallurgical and foundry furnaces, lime kilns, etc.

PULLEYS

Belt. Belt Pulley Models (Herstellung von Riemenscheibenmodellen), Richard Lower. Werkstattstechnik, vol. 17, no. 2, Jan. 15, 1923, pp. 39–41, 14 figs. Discusses designs to economize metal in casting.

PULVERIZED COAL

Central Stations. Pulverized-Coal-Burning Central Station, Bruay Mines, France, Jacques Boyer. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 183–184, 3 figs. Installation said to be one of largest pulverized-coal-burning plants in Europe, embodying several improvements as compared with general European practice. Translated from Nature, no. 2543, Dec. 30, 1922, p. 422.

Combustion. Combustion of Powdered Coal, Henry Kreisinger and John Blizard. Jl. Indus. & Eng. Chem., vol. 15, no. 3, Mar. 1923, pp. 249–251, 2 figs. Review of tests conducted by Bur. of Mines and Combustion Eng. Corp. on boilers fired with pulverized coal, showing that coal when pulverized may be burned with greater thermal efficiency for steam raising than when burned by any other methods.

Pulverizers and Driers. Pulverized Coal—Its Utilization in the Industries, Cecil F. Herington. Combustion, vol. 7, no. 6, Dec. 1922 and vol. 8, no. 1, Jan. 1923, pp. 345–350 and 362 and 42–48, 16 figs. History of pulverized coal; describes various types of driers and pulverizers.

Powdered Coal for Reverberatory Furnaces, J. B. Johnson. Combustion, vol. 8, no. 2, Feb. 1923, pp. 90–93, 6 figs. Describes powdered-coal plant of United Verde Copper Co., Clarkdale, Ariz., built for maximum capacity of 700 tons per 24-hr. day, designed to provide powdered coal fuel for six open-hearth reverberatory furnaces, including storage plant, conveyor system, dryers, etc.

PUMPING STATIONS

Diesel. Diesel Pumping Plant Shows Low Operating Cost, Arthur J. Hall. Power Plant Eng., vol. 27, no. 5, Mar. 1, 1923, pp. 274–276, 2 figs. Cost of pumping with Diesel engines is lower than with motor drive in Appleton (Wis.) municipal plant.

Underground. Pumping Station 360 Ft. Underground. Power, vol. 57, no. 13, Feb. 13, 1923, pp. 253–255, 4 figs. Supplanting air-lift system comprising ten deep wells with underground pumping station equipped with two 3500-gal.-per-min. two-stage centrifugal pumps driven by slip-ring induction motors equipped with liquid control.

PUMPS

Accumulator, Motor-Driven. Motor-Driven Accumulator Pumps, J. R. Penman. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 2, Feb. 1923, pp. 44–46. Account of author's experience.

High-Speed Reciprocating. High-Speed Pump with Ring Valves. Engineering, vol. 115, no. 2981, Feb. 16, 1923, p. 217, 6 figs. New design to meet demand for efficient, silent, high-speed pump for small and moderate deliveries; reciprocating, single-acting plunger type, fitted with makers' patent rubber-ring valves, working on gunmetal seats.

High-Vacuum. A High-Vacuum Mercury Steam Injector (Eine technische Hochvakuum-Quecksilber-Dampfstrahlpumpe), Hugo Stintzing. Zeit. für technische Physik, vol. 3, no. 12, 1922, pp. 369–377, 5 figs. Discusses characteristics of high-vacuum pumps, namely, required preliminary vacuum, final vacuum, speed of absorption, and operating safety; describes new steel steam injector developed by author.

Rotary. The Kitson-Utley Rotary Pumps. Engineering, vol. 115, no. 2983, Mar. 2, 1923, pp. 279–280, 8 figs. Essential feature of pump is that interior of drum forming blade chamber is so shaped that ends of blade are geometrically in contact with wall in any position so that no spring-control arrangements are required.

Screw Viscosity. Screw Viscosity Pumps. Engineering, vol. 114, no. 2968, Nov. 17, 1922, pp. 606–607, 2 figs. Discusses theory of viscosity pump for generating high hydraulic pressures.

Types. Hydraulic Pumps (Les Pompes Hydrauliques). France-Belgique, vol. 3, no. 1, Jan. 1923, pp. (Revue de l'Ingenieur Section) 16–121, 124 figs. A series of articles by different authors giving detailed description and calculations of centrifugal, piston, rotary, fire, and gyroscopic pumps. Bibliography.

PUMPS, CENTRIFUGAL

Characteristics. Chief Characteristics of Centrifugal Pumps, Robert W. Angus. Can. Engr., vol. 44, no. 7, Feb. 13, 1923, pp. 225–227, 5 figs. High speed and compactness important factors in operation; double-suction pumps give higher efficiencies; advantage of low-suction lift; effect of changing impeller or guide ring.

Hot-Water Heating. The Use of Centrifugal Pumps in Heating Installations, A. H. Barker. Domestic Eng. (British), vol. 43, nos. 1 and 2, Jan. and Feb. 1923, pp. 12–17 and 29–33, 10 figs. Considerations of flow of water through pipes of heating installations; power necessary to supply circulating head for installations; describes centrifugal pump, how it works, factors bearing on its efficiency, and meaning of different kinds of efficiency in connection with a centrifugal pump.

Testing Motor-Driven. The Testing of Motor-driven Centrifugal Pumps, G. A. Wedgwood. Beama, vol. 12, no. 58, Feb. 1923, pp. 87–92, 3 figs. Describes how graphical method may be applied to complete test.

Theory. The Theory of Centrifugal Pumps (Zur Theorie der Zentrifugalpumpen), W. van der Smissen. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 1, Jan. 6, 1923, pp. 13–15, 8 figs. Points out discrepancies of theoretical calculation and cause thereof; derivation of correct equations; verification of Hagens' experimental results.

R

RAILWAY ELECTRIFICATION

Advantages. Railway Electrification, Vincent Raven. Ry. Gaz., vol. 38, no. 5, Feb. 2, 1923, pp. 159–161. Advantages which may result from substitution of electric for steam locomotive operation. (Abstract.)

Economics of. Progress Report of the Special Committee on Electrification of Steam Railways. Am. Soc. Civ. Engrs.—Proc., vol. 49, no. 3, Mar. 1923, pp. 488–490. Study of subject from viewpoint of economics of problem.

Germany. Main-line Electrification in Germany. Elecn., vol. 90, no. 2331, Jan. 19, 1923, pp. 60–63, 7 figs. Comparison with other countries; electrified railways of Germany; system employed; economies that justify electrification; operation on Silesian mountain railways; details of locomotives and motor design; transformer details; control arrangements; driving mechanism; axle loading; gear drives; outputs of steam and electric locomotives. Compiled mainly from lecture by W. Wechmann, Elektrotechnische Zeit., vol. 43, p. 805.

Hungary. Electrification of the Hungarian Railways (Uber die Elektrifizierungsarbeiten der kön. ungarischen Staatsbahnen), Verebely. Elektrotechnik u. Maschinenbau, vol. 41, no. 2, Jan. 14, 1923, pp. 41–45. Traffic problems proposed; lines to be electrified; data on electric equipment; mechanical and electrical data of locomotives.

Sweden. Electrification of the Swedish Railway Nordmark Klarälfvens (Die Elektrisierung der schwedischen Nordmark Klarälfvens-Eisenbahn), E. Wist. Verkehrstechnik, vol. 39, no. 44, Nov. 3, 1922, pp. 541–544, 4 figs. Hydroelectric power works; 25-cycle polyphase current, 12,000 to 16,000 volts, for traction current; electric and mechanical equipment of cars and locomotives.

Switzerland. Economic Prospects of Swiss Railway Electrification Ten Years Ago and Now (Die Wirtschaftlichkeits-Aussichten der Elektrifizierung der schweizerischen Eisenbahnen vor zehn Jahren und heute), W. Kummer. Schweizerische Bauzeitung, vol. 81, no. 5, Feb. 3, 1923, pp. 47–49, 3 figs. Compares present costs with those of 1913, and works out increased cost factor of 1.67 to 1.83 of today.

RAILWAY MAINTENANCE

Mechanical Equipment for. Mechanical Equipment Saves Men and Money, G. L. Moore. Ry. Age, vol. 74, no. 10, Mar. 10, 1923, pp. 559–563, 5 figs. Methods of operation adopted on Lehigh Valley during last 14 years which have reduced maintenance costs by substituting machinery for labor.

RAILWAY MANAGEMENT

Regulation. Railroad Regulation, Harley W. Brundige. Jl. Pac. Ry. Club—Proc., vol. 6, no. 10, Jan. 1923, pp. 7, 9, 11, 13, 15, 17, 19, 21 and 23. History of regulation, its development, how it has functioned in California, and problems encountered.

RAILWAY MOTOR CARS

Diesel-Electric. Diesel-Electric Railway Motor Cars in Sweden (Diesel-elektrische Triebwagen auf schwedischen Eisenbahnen), G. Soberski. Verkehrstechnik, vol. 40, no. 7, Feb. 16, 1923, pp. 52–53. Description of cars and results of operations, showing advantages of Diesel-electric drive.

Operating Local Railways by Means of Railway Motor Cars (L'exploitation des chemins de fer d'intérêt local par automotrices à moteurs à explosion), Pierre Jacquinot. Génie Civil, vol. 82, no. 4, Jan. 27, 1923, pp. 73–79, 16 figs. Design, construction and operation of Renault, Crochat and Berliet types, driven by explosion engines.

Gasoline. A French Petrol Rail Car. Engineer, vol. 135, no. 3498, Jan. 12, 1923, pp. 47–48, 4 figs. Details of 62–72-hp. rail car constructed by Schneider & Cie., Creusot; trial and working results.

Gasoline Rail Car Shows Good Fuel Economy. Ry. Age, vol. 74, no. 4, Jan. 27, 1923, pp. 273–274, 3 figs. Passenger rail car, built around Gramm-Bernstein 3-ton truck chassis, averages 12 mi. per gal.

Gasoline-Electric. Gasoline-Electric Railway Motor Cars (Note sur l'automotrice pétroléo-électrique du tramway départemental de Pithiviers à Toury), M. Watier. Annales des Ponts et Chaussées, vol. 2, no. 5, Sept.-Oct. 1922, pp. 160–174, 8 figs. Application of Crochat system, consisting of 4-cycle Aster explosion engine, a generating dynamo of 1000 to 1800 r.p.m., and electric motor, to Pithiviers-Toury line, France; for local traffic. Rolling stock; comparison with steam operation.

Modified Truck Chassis. Electric Brake and Axle with Reverse Gear Are Successful Railcar Units. Donald A. Hampson. Automotive Industries, vol. 48, no. 11, Mar. 15, 1923, pp. 606–609, 4 figs. Modified truck chassis with braking system, axles and wheels especially designed for railway service; averages over 12 mi. per gal. of fuel; built around Gramm-Pioneer truck chassis.

RAILWAY OPERATION

Traffic Control. Some Important Aspects of Railway Traffic Operation, Ashton Davies. Inst. of Transport—Jl., vol. 4, no. 5, Mar. 1923, pp. 175–182, 1 fig. Deals with provision of such statistical data as will enable railway to be successfully supervised and controlled.

Train Control. Automatic Train Control. Ry. Signal Engr., vol. 16, no. 3, Mar. 1923. Contains following articles: G. R. S. Automatic Train Control, pp. 113–116, 9 figs.; The Simmen System of Speed Control and Train Dispatching, pp. 117–118, 2 figs.; The Miller Automatic Train Control, pp. 118–119, 4 figs.; The Indiana Equipment Corporation System of Train Control, pp. 120–122, 4 figs.; Shadle Automatic Train Signal-Stop, pp. 122–124, 2 figs.; The Schweyer Induction Train Control, pp. 124–125, 2 figs.; The Richards Train Control System, pp. 126–130, 4 figs.

RAILWAY REPAIR SHOPS

Boiler Shops. Equipment for Locomotive Boiler Repair Shops. Boiler Maker, vol. 23, no. 2, Feb. 1923, pp. 31–35, 10 figs. Arrangement, types and capacities of machines for use in carrying out major boiler work; factors entering shop design.

Methods and Machinery. Repair Work in a Georgia Railroad Shop, S. Ashton Hand. Am. Mach., vol. 58, no. 11, Mar. 15, 1923, pp. 403–406, 14 figs. Methods and equipment of Central of Georgia Ry. shops, Macon.

Street Cars. Upkeep of Street Cars (Wirtschaftliche Wagenunterhaltung), Karl Beneke. Verkehrstechnik, vol. 39, nos. 44 and 46, Nov. 3 and 17, 1922, pp. 537–541 and 559–562, 10 figs. Repair-shop organization; shop management and its auxiliaries.

RAILWAY SHOPS

Machinery, Deficient. Lack of Modern Machinery Handicaps Railroads, E. L. Woodward. Ry. Age, vol. 74, no. 3, Jan. 20, 1923, pp. 219–223, 8 figs. Net earnings reduced by need of machinery to repair equipment with desired speed and economy; remedial suggestions.

REFRACTORIES

Thermal Conductivity. Structure and Thermal Conductivity of Refractories (Gefüge und Wärmeleitvermögen feuerfester Steine), Max Jakob. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 6, Feb. 10, 1923, pp. 126–127. In measurement of heat conductivity of magnesite bricks, wide varying results have been obtained by different observers; writer seeks to show that this is due to differences in structure; possibilities for production of refractories with high or low conductivity.

The Thermal Conductivity of Refractory Materials at High Temperatures, A. T. Green. Ceramic Soc.—Trans., vol. 21, Part 4, Session 1921–22, pp. 394–414, 4 figs. Review of previous work, together with principles of thermal conductivity; theory of present investigation, experimental considerations, calculation and discussion of results. References.

REFRIGERATING MACHINES

Absorption System. Checking Up on the Absorption System, Heywood Cochran. Power Plant Eng., vol. 27, no. 6, Mar. 15, 1923, pp. 328–331, 4 figs. Operating pointers which aid in efficient use of exhaust-steam type of refrigerating machine.

Ammonia. Flooding in Ammonia Refrigerating Machines (Das Arbeiten mit Ueberflutung bei Ammoniak-Kühlmaschinen), Constanz Schmitz. Wärme- u. Kälte-Technik, vol. 25, no. 1, Jan. 1, 1923, pp. 3–8. Improvements in working process in ammonia refrigerating machines by allowing vapors to leave refrigerator very wet and yet arrive dry to compressor; results of tests made.

Heat Waste in. Heat Waste in the Ammonia Compression Refrigerating Machine, J. H. H. Voss. Refrig. Eng., vol. 9, no. 8, Feb. 1923, pp. 249–251, 5 figs. Describes plain method of temperature-entropy graph for comparing actual with ideal performance of heat carrier; method is said to be more reliable than indicator card, and is easily available.

REFRIGERATING PLANTS

Brine Circulation. Brine Circulation with Centrifugal Pumps, Russell K. Annis. Power, vol. 57, no. 11, Mar. 13, 1923, pp. 401–402, 3 figs. Effects on centrifugal pump when liquids heavier than water are handled. Frictional resistance of brine; handling brine with water pump.

Insulation for, Thickness of. The Economic Thickness of Insulation in the Refrigerating Field. Refrig. Eng., vol. 9, no. 8, Feb. 1923, pp. 254–258, 1 fig. Discussion of paper by P. Nicholls, published in same journal, Nov. 1922.

REFRIGERATION. See COLD.

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Alphabetical List on page 138

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(See Pans, Pumps, Traps, etc., Vacuum)

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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Roll Balancing Gear, E. Krahnen. Iron & Coal Trades Rev., vol. 106, no. 2866, Feb. 2, 1923, p. 161, 3 figs. Details of new German type of balancing gear and advantage claimed.

Brass. The Chase Metal Works. Metal Industry (N. Y.), vol. 21, no. 3, Mar. 1923, pp. 95–99, 9 figs. Consists of Chase metal works in Waterville, Conn., and Chase rolling mills in Waterbury, for production of brass sheet, rod and wire, and brass and copper tubing.

Plate Mills. 120-In. Motor Driven Plate Mill, W. Kennedy. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 2, Feb. 1923, pp. 39–41. Mill installed by Worth Steel Co., Claymont, Del.

ROPE DRIVE

Design and Maintenance. The Rope Drive—Its Design and Maintenance, P. Kenyon. Ceramic Soc.—Trans., vol. 21, Part 4, Session 1921–22, pp. 337–354 and (discussion) 354–357, 9 figs. Advantages claimed for rope drive; pulleys; centrifugal tension; total allowable tension; slip; wear; grooves; center distances; under and over driving; splicing and fixing; etc. Particular application to potteries.

S

SAND, MOLDING

Washing and Drying. California Sand for Foundry Practice. West. Machy. World, vol. 14, no. 1, Jan. 1923, pp. 14–15, 5 figs. Washing and drying plant of Del Monte Properties Co. at Lake Kajella.

SCREW THREADS

Measurement. Screw-Thread Measurements (Gewindemessungen), G. Berndt. Zeit. fur technische Physik, vol. 3, no. 12, 1922, pp. 381–386, 8 figs. Recommends for workshops new measuring instrument for comparative measurements only.

SEAPLANES

Design. Seaplanes, C. R. Fairey. Aeroplane, vol. 24, no. 7, Feb. 14, 1923, pp. 113–114, 116, 118 and 120. Modern types; flying boat; float type; seaworthiness; handling; problems of design; comparison with airplane. Abstract of paper read before Air Conference.

SHERARDIZING

Extent of Coating. Sherardized Coatings—Where They Serve Best, F. L. Wolf. Raw Material, vol. 6, no. 1, Jan. 1923, pp. 12–14, 9 figs. Deals with results of series of practical experiments made with view to determining amount of coating deposited by sherardizing.

SILICON STEEL

Brittleness. Low-temperature Brittleness in Silicon Steels, Norman B. Pilling. Am. Inst. Min. & Met. Engrs.—Trans., no. 1220-S, Feb. 1923, 10 pp., 7 figs. (also abstract) in Min. & Metallurgy, vol. 4, no. 194, Feb. 1923, p. 90, 2 figs. It is shown that brittleness is inherent property of iron, modified by alloyed silicon; commercial silicon steel becomes brittle when silicon content exceeds 4.2 per cent; brittleness is only slightly modified by heat treatment.

SMOKE

Metallurgical. Smokes. Royal Soc.—Proc., vol. 102, no. A 718, Feb. 1, 1923, pp. 600–627, 10 figs, partly on supp. plate. Part 1: Study of their behavior and a method of determining number of particles they contain, by R. Whytlaw-Gray, J. B. Speakman and J. H. P. Campbell. Part 2: Method of determining size of particles in smokes, by R. Whytlaw-Gray and J. B. Speakman. References.

SPRINGS

Automobile. Can More Flexible Front Springs Be Successfully Used? George L. McCain. Automotive Industries, vol. 48, no. 9, Mar. 1, 1923, pp. 516–517, 2 figs. Suggests method of using double transverse springs arranged to take place of usual type of front axle; novel layout of steering linkage proposed to avoid wheel wobble.

Laminated Railway. Laminated Spring Design. Ry. Engr., vol. 44, no. 517, Feb. 1923, pp. 56–61, 6 figs. General analysis of factors involved in design of railway springs.

STANDARDIZATION

Automobile. Current Standardization Work. Soc. Automotive Engrs.—Jl., vol. 12, no. 1, Jan. 1923, pp. 124–128, 7 figs. Brake lining; clutch-release-type thrust ball bearings; engine numbers; iron and steel specifications; fuel and lubrication; pipe fittings; license-plates and brackets; motor-truck rating; radiator nomenclature; etc.

STANDARDS

German N. D. I. Reports. Report of German Industrial Committee on Standards (Normenausschuss der Deutschen Industrie). Maschinenbau, vol. 2, no. 9, Feb. 8, 1923, pp. N63–N66, 5 figs. Includes list of newly published standard sheets. Tentative proposals for screw and spindle holes, hexagonal wooden screws, etc. Proposed standards for high-frequency terminology; mass and weight; density and specific weight; units for mechanical magnitudes.

Report of the German Industrial Standards Committee (Normenausschuss der Deutschen Industrie), Maschinenbau (Mitteilungen des NDI), vol. 2, no. 8, Jan. 26, 1923, pp. N55–N60, 5 figs. Proposals of Board of Directors for designation of screws and nuts. Proposed standards for sheet iron and rolled ingot steel.

STAYBOLTS

Zwilling. Zwilling Staybolts (Mitteilungen über Zwillingstehbolzen), H. Lorenz. Glasers Annalen, vol. 92, nos. 2 and 3, Jan. 15 and Feb. 1, 1923, pp. 22–32 and 92–46, 40 figs. Gives results of tests, theoretical investigations and calculation of Zwilling type of staybolts and discusses advisability of substituting iron for copper in their construction. Paper read before German Mech. Soc. and discussion in issue of Feb. 1.

STEAM

Research. Progress in Steam Research. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 165–168, 6 figs. Reports and comments on progress at A.S.M.E. meeting as follows: The Joule-Thomson Effect in Superheated Steam, R. V. Kleinschmidt. Steam Investigation Program at the Research Laboratory of Physical Chemistry, M. I. T., F. G. Keyes. Steam Research at the U. S. Bureau of Standards, N. S. Osborne.

STEAM-ELECTRIC PLANTS

Australia. The Morwell Brown Coal and Electrical Scheme, Victoria, Australia. Engineer, vol. 135, no. 3503, Feb. 16, 1923, pp. 163–164. Description of scheme which it is hoped will be brought into service in 1924.

Honolulu. Power Plant of the Hawaiian Electric Company, Ltd., Honolulu. Power, vol. 57, no. 10, Mar. 6, 1923, pp. 360–362, 5 figs. Details of equipment.

Leicester, England. Leicester's Electricity Supply. Elec. Ry. & Tramway Jl., vol. 48, no. 1166, Jan. 12, 1923, pp. 17–20, 5 figs. Description of new power station supplying electricity for traction, power and lighting; boiler plant comprises 4 boiler units of Babcock & Wilcox type, having steam capacity each of 45,000 lb. per hour; generating plant consists of one 10,000-kw. impulse turbine coupled to a 6600-volt 50-period 3-phase alternator.

Office-Building Group. Central Heat and Power Plant for Group of Office Buildings, George C. Stierhoff. Power, vol. 57, no. 9, Feb. 27, 1923, pp. 316–318, 5 figs. Plant located in residential section of city, supplies light, heat, power and other services; main units, poppet-valve engines direct-connected to generator; boilers fired with underfeed stokers; ashes handled by steam-jet conveyor.

Three-Phase. Electrical Developments at Stoke-on-Trent. Elecn., vol. 90, no. 2331, Jan. 19, 1923, p. 66, 2 figs. How several systems are supplied from one 3-phase station.

Wood-Refuse-Burning. Furniture Plant Uses Wood Refuse as Fuel. Power Plant Eng., vol. 27, no. 6, Mar. 15, 1923, pp. 303–308, 8 figs. At plant of Berkey & Gay Furniture Co., wood refuse forms 70 per cent of total fuel supply; details of equipment.

STEAM ENGINES

Uniflow. Valve-Gear Designs of British Uniflow Engines. Power, vol. 57, no. 7, Feb. 13, 1923, pp. 246–248, 11 figs. It is shown that British uniflow engines have as varied valve gearing as American engines.

STEAM POWER PLANTS

Boiler-Load Indicator. The Kent Boiler Load Indicator. Engineering, vol. 115, no. 2982, Feb. 23, 1923, pp. 234–235, 7 figs. Describes new type of steam meter for boiler-house service.

Heat Storage in. Heat Storage in Steam Plants (Die Wärmespeicherung in der Dampfwirtschaft), Clemens Kieselbach. Zeit. fur die gesamte Giesserei-praxis, vol. 44, no. 3–4, Jan. 27, 1923, pp. 18–20. Steam and heat accumulation; necessary conditions for steam entering and leaving accumulator; pressures; initial cost data; etc.

Natural Steam Sources. The Geothermic Power Plant in Larderello (Italy) [Das geothermische Kraftwerk in Larderello (Italien)], Wilhelm Wieder. Elektrotechnische Zeit., vol. 44, no. 6, Feb. 8, 1923, pp. 122–125, 4 figs. Describes plant for production of boric acid through utilization of natural steam sources in Province of Pisa.

Types. Production and Utilization of Steam as Motive Power (La production et l'utilisation de la vapeur comme source de force motrice). Technique Moderne, vol. 14, no. 13, Dec. 1, 1922, pp. 513–560, 41 figs. Stationary steam-generating apparatus: types, superheaters, preheaters, economizers, fuels, grates, stokers, control apparatus, water purification; stationary steam engines: piston type, turbine type, condensers; marine steam boilers; types, fuels, grates; marine steam engines: piston type, turbine type, condensers; steam locomotives: superheating, fuels, firing turbine type.

STEAM TURBINES

Coal-Mine Power Plants. Turbine Machinery for Colliery Power Stations, C. H. N. Naylor. Iron & Coal Trades Rev., vol. 106, no. 2869, Feb. 23, 1923, pp. 272–274, 4 figs. Compares use of mixed-pressure and high-pressure turbines. Notes on steam accumulators; condenser; vacuum; and cooling towers. Paper read before joint meeting of Nat. Assn. Colliery Mgrs. and Assn. Min. Elec. Engrs.

Troubles and Failures. A Review of Turbine Troubles and Their Causes, A. L. Mellanby and William Kerr. North-East Coast Instn. Engrs. & Shipbldrs., advance paper, no. 2683R for meeting Feb. 16, 1923, 18 pp. Discusses main causes and aspects of troubles and failures.

STEEL

Automobile, Inspection of. Some Notes on the Inspection of Steel for Automobile Use, R. J. Allen. Am. Soc. for Steel Treating, vol. 3, no. 1, Oct. 1922, pp. 43–46 and 97, 3 figs. Fracture, physical, and repeated impact tests; states that tests of inspecting are not extensive enough.

Chrome-Nickel. See CHROME-NICKEL STEEL.

Chrome-Vanadium. See CHROME-VANADIUM STEEL.

Cooling Velocity, Influence of. The Influence of Cooling Velocity on Location of Critical Points and Structure of Carbon Steels (Der Einfluss der Abkühlungsgeschwindigkeit auf die Lage der Haltepunkte und das Gefuge der Kohlenstoffstähle), W. Schneider. Stahl u. Eisen, vol. 42, no. 42, Oct. 19, 1922, pp. 1577–1584, 9 figs. Influence of heating and cooling velocity; tests with high cooling velocities; influence of heating temperature (initial temperature).

Distribution in New England. Steel Distribution in New England, Herbert R. Simonds. Iron Trade Rev., vol. 72, no. 8, Feb. 22, 1923, 2 figs. Various lines into which product is manufactured; consumption of bars, 587,000 tons in 1922; wire products, 310,000; rails, 113,795; value is 6.8 per cent of total for United States.

Metallographic Tests. Improvement in Crusher Steel Is Suggested by Metallographic Tests, Oscar E. Harder. Eng. & Min. Jl.—Press, vol. 115, no. 7, Feb. 17, 1923, pp. 314–318, 12 figs. Examination of failures of mine and mill equipment indicates that sufficient attention is not given to heat treatment in process of manufacture.

Silicon. See SILICON STEEL.

Stainless. Stainless Steel, Robt. N. Richardson. Eng. Production, vol. 6, no. 121, Jan. 25, 1923, p. 80. Consideration of its valuable properties.

STEEL CASTING

Centrifugal. New Patented Process for Steel Casting. Ry. & Locomotive Eng., vol. 36, no. 3, Mar. 1923, pp. 63–65, 4 figs. Describes McConway machine for casting steel under pressure by centrifugal process in vertical plane.

STEEL CASTINGS

Defects in. Blow Holes in Steel Castings. Metal Industry (Lond.), vol. 22, no. 5, Feb. 2, 1923, pp. 107–108. Deals with blowholes arising from condition of metal itself.

Defects in Steel Ingots and Castings, O. A. Knight. Forging & Heat Treating, vol. 9, no. 2, Feb. 1923, pp. 98–102, 6 figs. Discussion of common defects in ingots and castings; cracks; piping; blowholes; non-metallic inclusions; coarse crystallization; segregation.

STEEL, HEAT TREATMENT OF

Carbon and Alloy Steels. Heat Treatment of Electric Carbon and Alloy Forging Steels, Larry J. Barton. Forging & Heat Treating, vol. 9, no. 2, Feb. 1923, pp. 102–105. Characteristics of plain carbon and alloy steels containing nickel, chromium, molybdenum and vanadium; effect of heat treatment on physical properties.

Coal vs. Electricity for Heating. Heating by Combustion and by Electricity (Le chauffage par combustion et le chauffage électrique), Edgar Rosa. France-Belgique, vol. 2, no. 5, Nov. 1922, pp. 49–53. Heat treatment of tool steels; advantages of electric heating; comparison of heating with coal and electricity.

Quenching. The Effect of High-Temperature Quenching on the Microstructure of High-Carbon Steels, Howard Scott. Am. Soc. for Steel Treating—Trans., vol. 3, no. 6, Mar. 1923, pp. 593–623, 19 figs. Deals with conditions necessary to produce austenite at ordinary temperatures in plain high-carbon steel and metallographic properties of this constituent; study of transformations in cooling steel; effect of rate of cooling and thermal stress on distribution of martensite and troostite; aspects of transformation of austenite to martensite.

Tool Steel. Tool Steel Manipulation, L. K. Marshall. Am. Soc. for Steel Treating—Trans., vol. 3, no. 1, Oct. 1922, pp. 90–93. Discusses most important points encountered in actual practice of scientific heat treatment of tool steel.

STEEL, HIGH-SPEED

Tool Steel, Bibliography. Bibliography of High-Speed Tool Steels. Am. Soc. for Steel Treating—Trans., vol. 3, no. 1, Oct. 1922, pp. 47–89. Bibliography covering literature available, prepared by Eng. Societies Library, New York City, for use of Committee on High Speed Tool Steels of Division of Eng., Nat. Research Council; complete up to May 20, 1922.

STEEL MANUFACTURE

Colloid Chemistry Applied to. Application of Colloid Chemistry to Production of Clean Steel, H. W. Gillett. Am. Inst. Min. & Met. Engrs.—Trans., no. 1221-S, Feb. 1923, 7 pp., 4 figs.; and (abstract) in Min. & Metallurgy, vol. 4, no. 194, Feb. 1923, p. 95. Points out that making of both steel and non-ferrous alloys should be studied from colloid viewpoint.

Possibilities in Application of Colloid Chemistry to Production of Clean Steel, H. W. Gillette. Am. Inst. Min. & Met. Engrs., paper at meeting, Feb. 19–22, 1923, 11 pp. Selected bibliography.

Ingot Casting. Ingot Casting, J. Kent Smith. Metal Industry (Lond.), vol. 22, no. 8, Feb. 23, 1923, pp. 169–171, 8 figs. Process of freezing; top heat losses; methods of mechanical contraction; pouring temperature.

Open-Hearth Steel. Raw Materials for Making Martin Steel (Les matières premières employées pour la fabrication de l'acier Martin). Métallurgie, vol. 55, no. 7, Feb. 15, 1923, pp. 243–244. Basic and acid manufacture; hematite and phosphor pigs; action of content of manganese and silicon; scrap, rich and poor ore; ferroalloys.

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The Manufacture of Steel. G. A. Reinhardt. Blast Furnace & Steel Plant, vol. 11, no. 3, Mar. 1923, pp. 193–195, 2 figs. Processes involved in refining iron into steel; facts concerning production of open-hearth steel.

STEEL WORKS

Electricity in. Considerations in the use of Electricity in Steel Works, Wm. M'Farlane. West of Scotland Iron & Steel Inst.—Jl., vol. 30, part 3, Dec. 1922–23, pp. 31–39 and (discussion) 40–45, 6 figs. Discusses problem of production of electrical energy.

Krupp Plant, Essen. Today's Products of the Krupp Plants, Godfrey L. Carden. Iron Age, vol. 111, no. 11, Mar. 15, 1923, pp. 758–760, 6 figs. Large variety and range of products, of which steel or some metal is always basic element; employee loyalty a notable factor.

Pouring Device. Designs Pouring Device for Steelworks. Iron Trade Rev., vol. 72, no. 11, Mar. 15, 1923, p. 806, 1 fig. Pouring device for bessemer steel works and open-hearth furnace plants invented by Hubert Hermanns, Berlin.

Saar Valley. Dillingen Hutte Works—Saar Valley. Engineer, vol. 135, no. 3498, Jan. 12, 1923, pp. 31–32, 3 figs. Details of steel works, armor-plate shops and machine shops.

STOKERS

Arch for Chain-Grate. Deflecting Arches for Chain Grate Stokers, Henry Weaver. Power Plant Eng., vol. 27, no. 6, Mar. 15, 1923, pp. 314–315, 3 figs. Types of arches installed at rear of furnace which have been found effective in bettering combustion conditions.

Operation and Design. The Stoker Problem Discussed from an Operating Viewpoint, R. E. Dillon. Elec. World, vol. 81, no. 10, Mar. 10, 1923, p. 583. Factors controlling efficiency; design of clinker crushers claimed to be wrong; heating feedwater by bleeding main turbine units.

Pluto. The "Pluto" Stoker. Iron & Coal Trades Rev., vol. 106, no. 2867, Feb. 9, 1923, p. 191, 3 figs. Grate is in two sections, one slightly inclined downward from hopper, and other, towards back end, horizontal.

Small-Capacity Boilers. Mechanical Stokers for Boilers of Small Capacity, C. W. Roberts. Southern Engr., vol. 38, no. 6, Feb. 1923, pp. 36–40, 8 figs. Procedure in operation of mechanical stoker; fuel economy; advantages.

Underfeed. Nine Years with Underfeed Stokers and Illinois Coal, C. C. Cobb, Jr. Power, vol. 57, no. 9, Feb. 27, 1923, pp. 328–330, 1 fig. Data on average operating results and maintenance; difficulties encountered; how they were overcome and how high ratings are carried in spite of limited furnace volume.

SUPERHEATED STEAM

Experiments. Experiments on Superheated Steam, M. Stromeyer. Engineer, vol. 135, no. 3505, Mar. 2, 1923, pp. 241–242, 1 fig. Discusses Knoblauch's 133 experiments in Munich and Thomas' 83 experiments in America. (Abstract.) Memorandum to Manchester Steam Users' Assn.

T

TAPERS

Measuring. Measuring Tapers by Means of Discs and Rods, R. H. Worthy. Mech. World, vol. 73, no. 1882, Jan. 26, 1923, pp. 50–51, 5 figs. Particulars are given for providing simple and rapid formulas.

TAXIMETERS

Manufacture. Improvements in Light Metal Machining. Iron Age, vol. 111, no. 18, Feb. 22, 1923, pp. 529–530, 3 figs. Use of both hands and both feet of operator to increase production; multiple-tooth gear cutter effects large savings. Practice of Ohmer Fare Register Co., Dayton, Ohio, in making taxicab meter.

TEMPERATURE CONTROL

Regulator for. A New Type Automatic Temperature Regulator and Its Application to Heat Treating Furnaces, R. W. Newcomb. Am. Soc. for Steel Treating, vol. 3, no. 1, Oct. 1922, pp. 98–102, 2 figs. Describes machine of Charles Engelhard, Inc., and its operation.

TERMINALS, RAILWAY

Freight Facilities. Freight Facilities in the Proposed Terminal, Chicago. Ry. Rev., vol. 72, no. 5, Feb. 3, 1923, pp. 209–213, 2 figs. How Chicago & West. Ind. R. R.'s suggested terminal is planned to accommodate ultimate freight business.

Passenger. The Modernisation of Passenger Railway Stations, F. Bushrod and J. F. S. Tyler. Inst. of Transport—Jl., vol. 4, no. 5, Mar. 1923, pp. 166–175. Types of stations; arrangement of station offices, etc.; influence of electrification on station design; relation of layout of stations to signaling arrangements and benefit of modern signaling appliances; effect of station design on construction of time tables.

TESTING MACHINES

Gear and Piston-Ring. Some Interesting Gauging Appliances. Eng. Production, vol. 6, no. 124, Feb. 15, 1923, pp. 149–151, 9 figs. Machines for gear inspection and piston-ring testing.

TESTS AND TESTING

Laboratory, Pa. R. R. Origin and Development of the Pennsylvania R. R. Testing Laboratory, Geo. L. Fowler. Ry. & Locomotive Eng., vol. 36, no. 3, Mar. 1923, pp. 72–74. History of its establishment under Theodore V. Ely.

Methods. Modern Mechanical Material-Testing Methods (Neuere Mechanisch-technische Material-prufverfahren), G. Schulze. Maschinenbau, vol. 2, no. 8, Jan. 26, 1923, pp. G79–G84, 15 figs. Recommends use of short bar for testing tensile strength; static hardness determinations: Martens scratch test; Brinell test. Dynamic methods: impact-hardness and ball-hardness tests. Notched-bar and permanent shock tests, new testing arrangements and research work; Erichsen plate-testing apparatus.

TEXTILE MILLS

Electric Drive. Electric Drive for Textile Machinery (Der elektrische Antrieb von Textilmaschinen in der heutigen Entwicklung), Wintermeyer. Elektrotechnischer Anzeiger, vol. 40, nos. 14, 15 and 16, Jan. 24, 25 and 27, 1923, 97–98, pp. 105–106 and 111–112. Alternating current almost exclusively used; drive for individual machines and for groups of machines; types of motors suitable.

The Electric Drive in the Textile Industry. Elecn., vol. 90, no. 2336, Feb. 23, 1923. Contains following articles: Electrical Operation and Control of Textile Machinery and Processes, Frank Nasmith, pp. 188–189; The Conversion of Spinning and Weaving Mills from Steam to Electric Drive, V. Mallalieu, pp. 189–191, 4 figs.; An All-Electric Textile Mill, pp. 192–193, 5 figs.; Electricity and the Textile Industry, pp. 194–195, 4 figs.; Group Driving in a Lancashire Mill, p. 196, 2 figs.; Textile Drives and Motor Design, p. 197, 2 figs.

THERMIT WELDING

Cast Iron. Welding Cast Iron by Means of the Thermit Process, J. H. Deppeler. Am. Welding Soc.—Jl., vol. 1, no. 10, Oct. 1922, pp. 27–33, 6 figs. What thermit is; general directions for welding. Particularly adapted to welding of heavier parts.

TIME STUDY

Calculations. Avoiding Mistakes in Time Study Results, Eugene J. Benge. Management Eng., vol. 4, no. 3, Mar. 1923, pp. 195–197, 1 fig. Calculations which reduce errors in setting standard times.

Motion Study and. Time and Motion Study Defined, William Baum. Iron Trade Rev., vol. 72, no. 11, Mar. 15, 1923, pp. 810–812. Misconception of principles outlined by Taylor cause of much antagonism; it is claimed that nearly all plants offer opportunities for correct application; use of stop watch.

Rate Setting by. Rate Setting by Means of Elemental Time Study, Floyd M. Avery. Indus. Management (N. Y.), vol. 65, no. 3, Mar. 1923, pp. 161–163, 4 figs. Taking care of variable elements by rate curves.

TRACTORS

American Farm. American Agricultural Tractor Specifications. Automotive Industries, vol. 48, no. 8, Feb. 22, 1923, pp. 438–441. Includes American garden tractor specifications.

British Farm. British Agricultural Tractor Specifications. Automotive Industries, vol. 48, no. 8, Feb. 22, 1923, p. 437.

Creeper-Track. Creeper Track Machines. Motor Transport, vol. 36, no. 931 and 932, Jan. 1 and 8, 1923, pp. 6–8 and 39–41, 19 figs. Principles of track and how it works. Transmission of weight to ground; problems of track construction.

Fordson. Maintaining the Fordson Tractor. Motor Transport, vol. 36, no. 931, Jan. 1, 1923, pp. 14–15, 3 figs. Testing ignition; wiring troubles; air washer; tracing troubles; transmission.

Military. Cross-Country Tractors, G. le Q. Martel. Roy. Engrs. Jl., vol. 37, no. 1, Mar. 1923, pp. 115–122, 2 figs. Discusses conversion of brigade of artillery from horse to tractor transport.

TRAILERS

Automotive Transportation by. Automotive Transportation by Trailers, E. R. Greer. Soc. Automotive Engrs.—Jl., vol. 12, no. 1, Jan. 1923, pp. 19–20 (includes discussion), 1 fig. States that trailer operation is highly specialized form of transportation and has features of flexibility that make it of far greater importance than generally supposed; legal restriction in regard to gross weight, wheel loads, and axle loads; cost of operation; passenger transportation.

Reversible. A New Reversible Trailer. Motor Transport, vol. 36, no. 934, Jan. 22, 1923, pp. 99–100, 3 figs. Details of patent of R. A. Dyson & Co., with steering arrangements for backing.

TRAIN HEATING

Eletric-Heating Cars. A 15,000-Volt Electric Heating Wagon. Engineer, vol. 135, no. 3504, Feb. 1923, pp. 208–209, 4 figs. High-voltage heating car, placed in commission on Swiss Federal Rys., built by Brown, Boveri & Co., Baden, and Sulzer Bros., Winterthur; details of electric boiler.

TUBES

Manufacture. Manufacture of Solid Drawn Steel Tubes, J. A. Richards. Inst. Mar. Engrs.—Trans., Feb. 1923, pp. 445–462 and (discussion) 462–468, 9 figs. Explanation of various processes employed.

The Manufacture of Iron and Steel Tubes, Ewald Röber. Eng. Progress, vol. 3, no. 11, Nov. 1922, pp. 250–254, 5 figs. Methods of manufacturing welded and seamless tubes; working range and diameters, length and thickness.

TUBING

Nickel. Manufacture of 99 Per Cent Nickel Tubing, F. L. Prentiss. Iron Age, vol. 111, no. 11, Mar. 15, 1923, pp. 743–744, 4 figs. Commercially successful processes for both seamless and welded products developed by American Nickel Corp.

Welded Steel. Making Welded Steel Tubing. Machy. (Lond.), vol. 21, no. 543, Feb. 22, 1923, pp. 641–643, 8 figs. Rolling tubing; welding by electric or oxy-acetylene process; finishing welded seam.

TURBO-GENERATORS

Cooling. The Cooling of Turbine Generators, A. R. Smith. Gen. Elec. Rev., vol. 26, no. 2, Feb. 1923, pp. 83–87, 6 figs. Heat transfer in surface air coolers.

Pedestals. The Design of Structural Supports for Turbo-Generators. Am. Soc. Civ. Engrs.—Proc., vol. 49, no. 2, Feb. 1923, pp. 274–278. Discussion of paper by Edward H. Cameron, published in Jan. 1923, Proc.

U

U. S. BUREAU OF STANDARDS

Publications, List of. Publications of the Bureau of Standards. U. S. Bur. of Standards—Circular, no. 24, July 1, 1922, 182 pp. List of publications of scientific and technologic papers, circulars, handbooks and miscellaneous publications, including alphabetical index of topics.

V

VENTILATION

Warm-Air Heating and. Ventilation and Warm-Air Heating, G. A. Voorhees. Sheet Metal Worker, vol. 14, no. 3, Mar. 2, 1923, pp. 81–82. Relation of temperature to ventilation.

VIBRATION

High-Speed Machinery. Vibration in Small Direct Connected Units, H. M. Phillips. Power, vol. 57, no. 11, Mar. 13, 1923, pp. 398–400, 2 figs. Although usually attributed to unbalance, vibration, in author's opinion, is more frequently due to misalignment or coupling trouble, which can be corrected by comparatively simple means.

VOCATIONAL EDUCATION

A.S.M.E. Committee Report. Means for Vocational Training for the Industries. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 169–179. Report of A.S.M.E. Committee on Education and Training for Industries: Extension and Correspondence Schools, James A. Moyer. Schools for Apprentices and Shop Training, R. L. Sackett. Industrial Education as Represented in Schools, C. R. Richards. Discussion.

W

WAGES

Group Bonus System. Group Bonus System (Der Gruppenakkord), Egon Broecker. Stahl u. Eisen, vol. 42, nos. 41 and 42, Oct. 12 and 19, 1922, pp. 1553–1559 and 1584–1591. Discusses system according to which contract for a job is let to a group of workers for a given sum to be shared by the workers. Bibliography.

Standardization of Systems. Standardization of German Wage-Payment Systems (Vereinheitlichung der deutschen Lohntarife), Paul Schmerse. Stahl u. Eisen, vol. 43, nos. 5 and 6, Feb. 1 and 8, 1923, pp. 145–153 and 191–194, 5 figs. German wage-payment methods; time premium payment; new piece-rate payment; percentage wage scale.

WELDING. See ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE; OXY-ACETYLENE WELDING; THERMIT WELDING.

WIRE MANUFACTURE

Industrial Museum, Worcester. Story of Wire in Picture and Product, John Nelson. Iron Age, vol. 111, no. 11, Mar. 15, 1923, pp. 733–738, 8 figs. Describes Industrial Museum of Am. Steel & Wire Co. at Worcester, Mass.

WOOD

Kiln Drying. Kiln Drying of Lumber, F. O. Farey, Can. Ry. Club—Proc., vol. 22, no. 1, Jan. 1923, pp. 20–37 and (discussion) 37–41, 1 fig. Study of kiln; various schedules for drying lumber; and condition which should be obtained in finished product.

WOODWORKING MACHINES

Design. New Factors Influencing the Design of Woodworking Machinery, Seru Madsen. Mech. Eng., vol. 45, no. 3, Mar. 1923, pp. 180–182, 3 figs. Discusses such factors as adoption of high-speed steel, demands of greater economy, power and speed, use of ball bearings, and direct application of electric drive; and summarizes problems of driving and fitting cutter heads. Points out savings in power resulting from use of ball-bearing motor-driven arbors. Tables of synchronous-motor speeds and motor speeds available for two or three frequencies.

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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

THE ENGINEERING INDEX

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THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

Photoprint copies (white printing on a black background) of any of the articles listed in the Index may be obtained at a price of 25 cents a page. When ordering photoprints identify the article by quoting from the Index item; (1) Title of article; (2) Name of periodical in which it appeared, (3) Volume, number, and date of publication of periodical; (4) Page numbers. A remittance of 25 cents a page should accompany the order. Orders should be sent to the Engineering Societies Library, 29 West 39th Street, New York.

(See also page 400 of this issue for supplementary items.)

ABRASIVE WHEELS

Dressing and Truing. Dressing and Truing of Abrasive Wheels for Surface Grinding Machines. F. O. Wyse. Am. Mach., vol. 58, no. 14, Apr. 5, 1923, pp. 501-502, 4 figs. Distinction between dressing and truing; self truing of wheels on heavy vertical surface grinding machines.

Practical Abrasive Wheel Truing. Howard P. Drake. Abrasive Industry, vol. 4, no. 2, Feb. 1923, pp. 31-33, 12 figs. Diamonds and mechanical devices are used for dressing and truing wheels; describes several forms of diamond settings.

Manufacture. Grinding Wheels—How They Are Made—Raw Material, vol. 6, no. 3, Mar. 1923, pp. 113-118, 17 figs. Methods of manufacture and different kinds of wheels available. Chapter from book on grinding published by Norton Co.

AERONAUTICS

Nomenclature. The New Nomenclature for Aeronautics. Ladislas d'Orcy. Aviation, vol. 14, no. 16, April 16, 1923, pp. 418-419. Critical remarks on Report 157 of Nat. Advisory Committee for Aeronautics.

AIRPLANE ENGINES

Bearings. Machining Half Bearings for Airplane Motors. Walter L. Adams. Am. Mach., vol. 58, no. 9, Mar. 1, 1923, pp. 335-336, 6 figs. Method devised during world war for making bearings with unskilled operators, fixtures used.

Bristol. The Bristol "Cherub" Flat Twin Aero-Engine. Flight, vol. 15, no. 9, Mar. 1, 1923, pp. 117-119, 6 figs. Air-cooled engine of 1070 cc. capacity; rated hp. 18 at 2500 r.p.m.; weight, 85 lb.

Liberty. Is the Liberty Engine "Obsolescent?" L. D. Seymour. Aerial Age, vol. 16, no. 4, Apr. 1923, pp. 174-175. Account of changes that have added to usefulness of engine; problem of lubrication; fuel system and fire hazard; electric system.

Paris Show. Airplane Engines at the Paris Exhibition (Les groupes motopropulseurs au Salon). C. Martinot-Lagarde. Aeronautique, vol. 5, no. 45, Feb. 1923, pp. 52-61, 11 figs. Data on various types of engines; particulars of cylinders, lubrication, ignition, carburetors, reduction gears, etc.

Statax. The New 8 Hp. "Statax" Engine. Flight, vol. 15, no. 12, Mar. 22, 1923, p. 157, 2 figs. Modifications introduced in latest model of engine designed and manufactured by F. J. M. Hansen, Cologne, Germany.

AIRPLANES

Carrying Capacity. "Quality" in Aviation (La "qualité" en aviation). L. Hirschaufer. Technique Moderne, vol. 15, no. 6, Mar. 15, 1923, pp. 161-165, 8 figs. Discusses quality understood to mean total efficiency of airplanes considered as weight carriers.

Column Formulas. Comparison of Column Formulas. J. S. Newell and A. S. Niles, Jr. Air Service Information Circular, vol. 4, no. 395, Feb. 15, 1923, 4 pp., 2 figs. General classification and comparison of types of formulas; problem of restrained ends. Combination of Johnson parabolic with Euler formula is recommended for design of all airplane struts and columns.

Gliders. Gliding Flight and Airplane Design (Segelflug und Flugzeug-Bautechnik). Walter Fritsch. Schweizerische Bauzeitung, vol. 81, no. 10, Mar. 10, 1923, pp. 119-121, 11 figs. partly on p. 118. Review of development and principles underlying design.

Low-Powered. A Low-Powered Aeroplane. Aeroplane, vol. 24, no. 14, Apr. 4, 1923, pp. 256 and 258, 3 figs. Little single-seater monoplane designed by Air Navigation Co. Span, 32 ft. 10 in.; area, 145 sq. ft.; weight empty 273 lb., loaded 458 lb.; speed, 32-78 mi. per hr.

Requisites. The Special Requisites of an Aplirane (Die besonderen, an ein Flugzeug zu stellenden Anforderungen). G. Reinhard. Motorwagen, vol. 26, no. 6, Feb. 28, 1923, p. 88. List of requirements of military, commercial and sport airplanes.

Seaplanes. See SEAPLANES.

Speed-Measuring Stations. Bamberg Speed Measuring Station. E. F. Bacon. Air Service Information Circular, vol. 4, no. 397, Feb. 15, 1923, 7 pp., 10 figs. Information for installation and operation of station.

Sport. The Udet Sporting Two-Seater. Flight, vol. 15, no. 9, Mar. 1, 1923, pp. 122-123, 5 figs. Monoplane built by Udet Aircraft Works of Munich, Bavaria, with 35-hp. Haacke engine.

Wings. The Distribution of Load Among the Spars in Multi-Spar Construction of Airplane Wings. J. S. Newell. Air Service Information Circular, vol. 4, no. 394, Feb. 15, 1923, 10 pp., 11 figs. Investigation of number of methods of apportioning load as applied to large three-spar metal wing; study of results obtained as compared with distribution indicated by sand test of this wing, and conclusions.

AIRSHIPS

Boerner. The Project of the Boerner Airship and Its Adaptability for Transoceanic Service (Das Projekt des Boerner-Luftschiffes und seine Eignung für den Ueberseeverkehr). H. Schwengler. Schiffbau, vol. 24, no. 17, Jan. 24, 1923, pp. 259-262, 3 figs. Airship has volume of 300,000 cu. m., capacity for 300 passengers with baggage and crew of 60, and cruising radius of 6000 to 7000 km. at speed of 120 km. per hr.

Commercial. The Establishment of a Self-Supporting Airship Service. C. Dennis Burney. Flight, vol. 15, no. 7, Feb. 15, 1923, pp. 95-96. Prospects of commercial success; financial problem. (Abstract.) Paper read before Air Conference.

Long-Haul Heavy-Traffic Service. The Airship for Long-Haul Heavy-Traffic Service. Ralph H. Upson. Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 235-237, 4 figs. Factors upon which value of airship as carrier depends; comparison of airship with other carriers, especially steamship; consideration of speed, route, cost of transport, and time value; design and construction methods; problems of stability, dynamic lift, mooring, and fire risk. (Abridged.)

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Copper. See COPPER ALLOYS.

Eutectic, Structure of. The Structure of Eutectics. Albert M. Portevin. Inst. of Metals, advance paper, no. 18, for meeting Mar. 7-8, 1923, 30 pp., 40 figs. Examination of microscopical structure of considerable number of binary eutectic alloys, based on which attempt is made to give methodical classification from data obtained. Photomicrographs.

Magnesium. See MAGNESIUM ALLOYS.

Monel Metal. See MONEL METAL.

ALUMINUM

Sheet, Work-Hardened. Tests on Work-Hardened Aluminum Sheet. H. C. H. Carpenter and C. Coldron Smith. Am. Inst. of Metals advance paper, no. 6, for meeting Mar. 7-8, 1923, 37 pp., 8 figs. Results of long-period heating tests on rate of softening of work-hardened aluminum sheet in temperature range 200 to 100 deg. cent.; total period of test was 41,000 hr. (4.68 yr.); mechanical tests were carried out on sheet from time to time. See also Metal Industry, vol. 22, no. 11, Mar. 16, 1923, pp. 247-252 (including discussion), 1 fig.

ALUMINUM ALLOYS

Aluminum-Copper. The Heat Treatment and Mechanical Properties of Alloys of Aluminum with Small Percentages of Copper. D. Hanson and Marie L. V. Gayler. Inst. of Metals advance paper, no. 12, for meeting Mar. 7-8, 1923, 13 pp., 5 figs. Alloys containing 0 to 2 per cent of copper are not appreciably affected by quenching from 500 deg. cent. and subsequent aging; alloys containing 2.5 to 5 per cent of copper are profoundly affected by this form of heat treatment. See also (abstract) in Engineering, vol. 115, no. 2985, Mar. 16, 1923, pp. 343-344, 5 figs.

Some Properties of the Copper-Rich Aluminium-Copper Alloys. R. C. Reader. Inst. of Metals advance paper, no. 19, for meeting Mar. 7-8, 1923, 18 pp., 12 figs. Investigation of alloys containing not more than 11 per cent of aluminum; deals with density, volume changes during and after solidification, self-annealing properties; effect of heat treatment on 10 per cent alloy. See also (abstract) in Engineering, vol. 115, no. 2985, Mar. 16, 1923, pp. 344-347, 22 figs.

Aluminum-Copper-Magnesium. The Constitution and Age-Hardening of the Ternary Alloys of Aluminum with Magnesium and Copper. Marie L. V. Gayler. Am. Inst. of Metals advance paper, no. 8, for meeting Mar. 7-8, 1923, 20 pp., 21 figs. Results of investigation show that when magnesium content is in excess of that of copper, alloys quenched from 400 deg. cent. do not age-harden, but when magnesium content is less than 2 per cent and copper content greater, age hardening does take place.

Aluminum-Copper-Nickel. The Constitution of Some Alloys of Aluminium with Copper and Nickel. Kathleen E. Bingham and John L. Haughton. Inst. of Metals advance paper, no. 5, for meeting Mar. 7-8, 1923, 42 pp., 40 figs. Investigation of ternary system copper, nickel, aluminum up to 12 per cent copper and 10 per cent nickel; methods used were (1) thermal analysis (2), electrical-resistance measuremeats at high temperatures, and (3) microscopic examination of quenched specimens previously annealed or slowly cooled from liquid state.

Aluminum-Copper-Silicon. Investigation of Copper-Silicon-Aluminum Alloys With and Without Manganese. E. H. Dix and A. J. Lyon. Air Service Information Circular, vol. 4, no. 385, Dec. 1, 1923, 27 pp., 23 figs. Investigation of mechanical and physical properties and casting qualities of alloys containing from 0 to 9 per cent silicon and from 0 to 6 per cent copper, and of effect of addition of 1 per cent manganese to certain of these alloys.

"Y" Alloy. The Production and Heat-Treatment of Chill-Castings in an Aluminium Alloy ("Y"). W. Rosenhain and S. L. Archbutt. Inst. of Metals advance paper, no. 20, for meeting Mar. 7-8, 1923, 19 pp., 15 figs. Study of properties of alloy in form of chill castings and contribution to detailed study of factors governing properties of chill and die castings generally. See also (abstract) in Metal In-

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NOTE—The abbreviations used in indexing are as follows:

Academy (Acad.)	Engineer[s] (Engr.[s])	Machinery (Machy.)	Record (Rec.)
American (Am.)	Engineering (Eng.)	Machinist (Mach.)	Refrigerating (Refrig.)
Associated (Assoc.)	Gazette (Gaz.)	Magazine (Mag.)	Review (Rev.)
Association (Assn.)	General (Gen.)	Marine (Mar.)	Railway (Ry.)
Bulletin (Bul.)	Geological (Geol.)	Materials (Matls.)	Scientific or Science (Sci.)
Bureau (Bur.)	Heating (Heat.)	Mechanical (Mech.)	Society (Soc.)
Canadian (Can.)	Industrial (Indus.)	Metallurgical (Met.)	State names (Ill., Minn., etc.)
Chemical or Chemistry (Chem.)	Institute (Inst.)	Mining (Min.)	Supplement (Supp.)
Electrical or Electric (Elec.)	Institution (Instn.)	Municipal (Mun.)	Transactions (Trans.)
Electrician (Elecn.)	International (Int.)	National (Nat.)	United States (U. S.)
	Journal (Jl.)	New England (N. E.)	Ventilating (Vent.)
	London (Lond.)	Proceedings (Proc.)	Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 136

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Machy. Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Elec & Mfg. Co.
Weston Electrical Instrument Co.

Anchorages, Overhead Transmission
Midwest Steel & Supply Co.

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Babbit Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdy. & Mach. Co.
* Timken Roller Bearing Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Machy. Co.

Blocks, Tackle
Clyde Iron Works Sales Co
* Roebling's, J. A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Baffles,
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Boiler Compounds
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Connelly, D. Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.
Link-Belt Co.

Bridgewalls (Furnace)
McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Cars, Charging
Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co.
Hyro Mfg. Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

dustry, vol. 22, no. 11, pp. 253-258, 12 figs.; and Engineering, vol. 115, no. 2985, Mar. 16, 1923, pp. 347-351, 14 figs.

ALUMINUM CASTINGS

Foundry Practice. Aluminum Sweeper Castings, Pat Dwyer. Foundry, vol. 51, no. 6, Mar. 15, 1923, pp. 209-215, 10 figs. Standardized methods and processes together with accurate molding equipment and close supervision said to be responsible for successful product uniform in weight and dimensions. Foundry practice at plant of Hoover Suction Sweeper Co., North Canton, Ohio.

AUTOMOBILE ENGINES

Assembling. Individual Engine Assembly Method Gets Greater Accuracy, J. Edward Schipper. Automotive Industries, vol. 48, no. 14, Apr. 5, 1923, pp. 773-774, 3 figs. "One man builds up entire Cadillac power plant from carefully inspected sub-assemblies considered worth while, in spite of slightly higher cost because of better parts interrelation.

Eight-Cylinder Vertical. Even Torque and Lack of Vibration Characterize Vertical Eight, P. M. Heldt. Automotive Industries, vol. 48, no. 15, Apr. 12, 1923, pp. 817-820, 10 figs. Detailed analysis of eight-in-line engines.

Lubrication. Well Designed Pistons Prevent Oil Pumping Troubles, M. Olley. Automotive Industries, vol. 48, no. 14, Apr. 5, 1923, pp. 779-780. In writer's belief, quantity of oil sprayed on lower part of cylinder wall need not be limited and has useful effect in cooling piston.

Spark Plugs. See SPARK PLUGS.

Valve-Action Analysis. Increase in Cam Tip Radius Effects Reduction in Inertia Forces, Glenn D. Angle. Automotive Industries, vol. 48, no. 15, Apr. 12, 1923, pp. 824-827, 13 figs. Investigation shows possible errors in use of straight line motion analyses for valves operated by rocker arms; effect of any slight modification in cam contour upon valve-action curves impossible to predict; important conclusions drawn.

AUTOMOBILE FUELS

Benzol and Alcohol. Benzol and Alcohol as Automobile Fuel (El uso del benzol y del alcohol como combustible en los automoviles), Oscar Navarro. Instituto de Ingenieros de Chile—Anales, vol. 22, nos. 8 and 9, Aug. and Sept. 1922, pp. 480-501 and 550-564, 6 figs. Automobile fuels used in Germany, their analysis and calorific value; mixtures of benzol and alcohol; results of automobile tests; tables of test data showing best results obtained with rich alcohol mixtures.

Heavy Oil. The Use of Heavy Fuel Oil for Motor Vehicles (Schwerolbetrieb bei Kraftwagen), A. Heller. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 10, Mar. 10, 1923, pp. 233-234, 6 figs. Methods employed by Berlin Omnibus Corp. and German State Post Office for use of heavy oil for their omnibus and motor-truck services.

Oxidized Kerosene. Engine Experiments With Oxidized Oils, J. H. James and F. C. Zeisenheim. Chem. & Met. Eng., vol. 28, no. 12, Mar. 21, 1923, pp. 543-545. Engine experiments with fuel made by catalytic oxidation of kerosene and fuel of similar character made by oxidation of gas oil show that oxidized kerosenes develop approximately same power as ordinary kerosene, and they show lower detonation tendencies than straight hydrocarbon fuel. Paper read before Am. Inst. Chem. Engrs.

AUTOMOBILES

Accelerators, Manufacture of. Manufacturing Methods and Machines of an Accelerator Factory, C. A. Handschin. West. Machy. World, vol. 14, no. 3, Mar. 1923, pp. 99-101, 14 figs. Mechanical equipment and methods used to advantage in plant of Williams Bros. Aircraft Corp.

Bignan. Three Bignan Models. Auto-Motor Jl., vol. 28, no. 13, Mar. 29, 1923, pp. 261-264, 14 figs. Particulars of 12-30-hp., 2-liter super-sports, and 10-hp. models.

Creeper-Track. Creeper Tracks for High Speed, W. F. Bradley. Autocar, vol. 50, no. 1432, Mar. 30, 1923, p. 531, 3 figs. Data on the Mors car, having 30-hp. Knight engine, capable of developing speed of 35 m.p.h., fitted with Citroen-Kegresse-type rubber and canvas flexible creeper band; and a 4-passenger Ford which has been converted to flexible creeper-track system. See also Motor Transport, vol. 36, no. 944, Apr. 2, 1923, pp. 413-414, 3 figs.

Cubitt. A New 15.9 Hp. Cubitt. Autocar, vol. 50, no. 1433, Apr. 6, 1923, pp. 560-561, 6 figs. Redesigned to give greater efficiency, improved road-holding qualities, and greatly enhanced appearance.

Durant. The 15.6 Hp. Durant. Auto-Motor Jl., vol. 28, no. 14, Apr. 5, 1923, pp. 283-286, 10 figs. Five-passenger model; monobloc 4-cylinder engine, capable of developing 33 b.hp. at 3000 r.p.m.

Humber. The 8 Hp. Humber. Auto-Motor Jl., vol. 28, no. 10, Mar. 8, 1923, pp. 197-200, 9 figs. New light car with 4-cylinder engine, detachable head, overhead inlet valves. See also Autocar, vol. 50, no. 1429, Mar. 9, 1923, pp. 402-403, 2 figs.

Matchless. Another Air-Cooled Small Car. Autocar, vol. 50, no. 1433, Apr. 6, 1923, pp. 568-569, 6 figs. Describes 10-hp. flat twin Matchless with 3-speed gear and 4-wheel braking mechanism.

North-Lucas. Experiences with a "Radial." Autocar, vol. 50, no. 1430, Mar. 16, 1923, pp. 451-453, 3 figs. Trial of North-Lucas car, an entirely unconventional vehicle and only one of its type.

Painting Practice. Painting Practice from the Chemist's Viewpoint, L. Valentine Pulsifer. Soc. Automotive Engrs.—Jl., vol. 12, no. 4, Apr. 1923, pp. 335-341. 1 fig. Discussion of résumé of two papers published in full in same journal, Jan. 1922 and Jan. 1923, respectively.

Racing. Miller Building Six Novel Racing Cars for 1923 Speed Events. Automotive Industries, vol. 48, no. 13, Mar. 29, 1923, pp. 714-715, 8 figs. Fitted with 122 cu. in. engines said to weigh 303 lb. and to turn at 4500 to 5000 r.p.m.; narrow frame and body help to minimize wind resistance.

Sporting. Low English Sporting Body for American Chassis. Automotive Mfr., vol. 64, no. 11, Feb. 1923, pp. 11-12, 1 fig. Speedy appearance of light sporting British 2-seater on Nash chassis furthered by streamline body with special rear deck.

The 22.5 hp. Sporting Pick. Autocar, vol. 50, no. 1432, Mar. 30, 1923, pp. 537-538, 3 figs. Details of fast car with relatively large and slow-speed 4-cylinder engine.

Steam. The Future of Steam, Kryle W. Williams. Motor Transport, vol. 36, no. 941, Apr. 2, 1923, pp. 415-416. Consideration of this form of power as applied to road motor vehicles and tractors. Summary of paper read before Instn. Eng. Inspection.

Szawe. Post-War German Car Shows Many Unusual New Features. Automotive Mfr., vol. 64, no. 6, Sept. 1922, pp. 10-13 and 27, 9 figs. Liberal use of light-weight metals produces light-car weight in large machine of 137-in. wheelbase; "airplane type" of lubrication system; automatic gear shifting.

AVIATION

Air-Power Policy. The Development of Air Power Policy, Arthur R. Blessing. Aerial Age, vol. 16, no. 4, Apr. 1923, pp. 165-168 and 181, 4 figs. Factors to be considered in formation and development of air-power policy.

British Airway Subsidy. The New British Airway Subsidy Scheme. Aviation, vol. 14, no. 13, Mar. 26, 1923, pp. 340-341. Report of Civil Air Transport Subsidies Committee to consider present working of scheme of cross-Channel subsidies and to advise on best method of subsidizing air transport.

Commercial. An Imperial Air Service, William Joynson-Hicks. Inst. of Transport—Jl., vol. 4, no. 2, Dec. 1922, pp. 73-78 and discussion, 78-79. Discusses use of airplanes for transport purposes.

Commercial Aviation: Some Truths on the Subject, P. D. Johnson. Aerial Age, vol. 16, no. 4, Apr. 1923, pp. 169-170, 2 figs. Arguments in favor of Civil Aeronautics Act of 1923.

Successful Commercial Aviation Analyzed, Temple N. Joyce. Aviation, vol. 14, no. 16, Apr. 16, 1923, pp. 420-422. Notes on pre-war aviation; war influences; question of personnel; post-war flying.

What is the Matter with Commercial Aviation? William Knight. Aerial Age, vol. 16, no. 4, Apr. 1923, pp. 177-180 and 185. Discusses conditions in the United States.

Safety. Passenger-Carrying Flying-Boat Operation, H. A. Bruno. Soc. Automotive Engrs.—Jl., vol. 12, no. 4, Apr. 1923, pp. 351-353. Convincing public that flying is safe; types of flying boats in use; 90-min. service between Cleveland and Detroit, and similar successful services. See also paper by R. R. Blythe, entitled Safety and Comfort as Inducements to Air Travel, p. 342.

AXLES

Alloy-Steel. New Views on Selection of Material for Street-Car Axles (Neuere Gesichtspunkte fur die Auswahl des Werkstoffes fur Strassenbahnwagenachsen), Kurt Schmidt. Verkehrstechnik, vol. 40, no. 11, Mar. 16, 1923, pp. 81-84, 5 figs. Results of experiments carried out by Krupp on carbon, nickel, manganese, silicon and chromium-nickel steels, showing difference in physical properties; recommends low-nickel-chromium alloy steel for high elongation.

B

BALANCING

Machine Parts. Balancing of Machine Parts, D. S. Kimball. Sibley Jl. of Eng., vol. 37, no. 3, Mar. 1923, pp. 56-59, 5 figs. Deals with balancing of rotating and reciprocating parts.

Turbines. Balancing Machine Utilized in the Field for Quickly Correcting Turbine Operation, H. D. Fisher. Power, vol. 57, no. 13, Mar. 27, 1923, pp. 480-481, 4 figs. Balancing at 140 r.p.m. on flexible mounting produces good operation at 3600 r.p.m.; balance corrections are calculated for convenience in attaching weights.

BEARINGS, BALL

Cages. Cages for Ball Bearings (Die Käfige für Kugellager), H. Behr. Elektrotechnische Zeit., vol. 44, no. 9, Mar. 1, 1923, pp. 196-197, 12 figs. Calculation of load distribution over separate balls to determine stress of cages; description and investigation of best-known cage types.

Load-Carrying Capacity. Load-Carrying Capacity of Deep Groove Bearings. Can. Machy., vol. 29, no. 5, Feb. 1, 1923, pp. 40-43, 9 figs. Experiments conducted to determine relation of radial and thrust stresses on single-row non-filling slot type of bearing; calculations based on actual working tests.

Manufacture. Manufacture and Regrinding of Ball Bearings, C. A. Handschin. West. Machy. World, vol. 14, no. 3, Mar. 1923, pp. 81-82 and 88, 12 figs. Methods and special equipment used in plant of Kelly Ball Bearing Co., San Francisco.

BEARINGS, ROLLER

Advantages. Roller Bearings for Track Vehicles (Rollenlager für Gleisfahrzeuge), Albert. Verkehrstechnik, vol. 40, nos. 9 and 10, Mar. 2 and 9, 1923, pp. 65-67 and 75-77, 30 figs. Advantages of roller over ball bearings; disk bearings; enumerates conditions for effective roller-bearing operations; conical and other types of roller bearings; cages; lubrication; etc.

Railway-Car. Stafford Roller Bearings for Pedestal Trucks. Ry. Age, vol. 74, no. 17, Mar. 31, 1923, pp. 872-873, 2 figs. Improvements incorporated in recent design of bearings for trucks of Mich. Central baggage car; original design was described in Ry. Age daily edition, June 16, 1922.

The Stafford Roller Bearing for Railway Cars. Ry. & Locomotive Eng., vol. 36, no. 4, Apr. 1923, pp. 102-104, 4 figs. Description of its design and performance on cars of Mich. Central R. R.

Spherical. Advantages of the Spherical Type Roller Bearing, H. E. Brunner. Ry. Mech. Engr., vol. 97, no. 4, Apr. 1923, pp. 225-227, 4 figs. New design which combines self-alignment, low frictional resistance and high capacity.

BELTING

Efficiency. Practical Facts About Belting. Paper, vol. 31, no. 19, Feb. 28, 1923, pp. 10-11. Comparative operating cost of leather and rubber belting; result of tests to determine relative power transmitted under given tension; advisability of investigating more than first cost.

Power Transmission by. Fundamentals of Transmission of Power by Belting, Louis W. Arny. Iron Age, vol. 111, no. 15, Apr. 12, 1923, pp. 1025-1026, 2 figs. Pulley grip and elasticity essential to efficiency in belt; large influence of arc of contact. See also Belting, vol. 22, no. 2, Feb. 1923, pp. 19-20, 2 figs.

Power Transmitting Capacity of a Belt, R. C. Moore. Paper, vol. 31, no. 22, Mar. 21, 1923, pp. 12-13, 2 figs. Tables of horsepower rating for leather belting; ideal condition and correction factors for differences; determination of arc of contact.

BLAST FURNACES

Cowper. Accelerated Heating of Cowpers by the P.S.S. Process (Pfoser-Stracke-Stumm) [Le chauffage accelere des Cowpers par le Procédé P. S. S. (Pfoser-Stracke-Stumm)], P. Lemoine. Revue de Metallurgie, vol. 20, no. 2, Feb. 1923, pp. 87-94, 8 figs. Advantages and savings due to this system.

Scrap, Use of. Obtaining Large Blast Furnace Production, D. T. Croxton. Iron Age, vol. 111, no. 13, Mar. 29, 1923, pp. 897-900, 2 figs. Operating records of Trumbull-Cliffs furnace with reference to use of scrap and hard ore combined with fast driving. See also Iron Trade Rev., vol. 72, no. 14, Apr. 5, 1923, pp. 1009-1013, 3 figs.

Stack Remodeling. Martins Ferry Stack Is Enlarged, J. D. Knox. Iron Trade Rev., vol. 72, no. 15, Apr. 12, 1923, pp. 1081-1084, 6 figs. Describes remodeling of stack of Wheeling Steel & Iron Co., Wheeling, W. Va.; production is augmented 75 tons daily.

BOILER FEEDWATER

Interior Treatment. Interior Treatment of Boiler Feed Water, A. J. Loppin. Power, vol. 57, no. 14, Apr. 3, 1923, pp. 520-522. Where interior treatment is allowable; principles of exterior and interior treatment.

Regulators. Copes Feed-Water Regulator. Mech. World, vol. 73, no. 1889, Mar. 16, 1923, pp. 172-173, 3 figs. Description of regulator and its operation.

Treatment. Feeding Boilers With Distilled and Air-Free Water (Wirtschaftliche Kesselspeisung mit destilliertem und luftfreiem Speisewasser), Wilhelm Muller. Elektrische Betrieb, vol. 21, no. 4, Feb. 24, 1923, pp. 37-39, 3 figs. Describes Atlas Works type of evaporation plant with preheater.

BOILER FIRING

Wood Refuse. Power from Wood Refuse at an Aeroplane Factory. Practical Engr., vol. 67, no. 1881, Mar. 15, 1923, pp. 146-147, 5 figs. Data on power plant and equipment of Bristol & Colonial Aeroplane Co.'s works at Filton, near Bristol, Eng., where nothing but wood refuse of factory is used as fuel for driving machinery.

BOILER FURNACES

Draft Regulation. Automatic Regulation of Furnace Draught. Times Trade & Eng. Supp., vol. 12, no. 245, Mar. 17, 1923, p. 19, 1 fig. Apparatus designed by H. Liese, Hamburg, to effect automatic regulation of draft with hand stoking.

Flue-Dust Separators. Improvements in Flue-Dust Catchers (Neues im Bau von Flugaschefängern), H. Pradel. Feuerungstechnik, vol. 11, no. 10, Feb. 15, 1923, pp. 109-113, 14 figs. Describes several improved types of flue-dust catchers for separation of flue dust and soot from heating gases.

Grate Changes. Changing Fuel and Grates in Steam Boilers (Brennstoffwechsel und damit verbundene Rostveränderung bei Dampfkesselanlagen). Elektrotechnischer Anzeiger, vol. 40, no. 40, Mar. 10, 1923, pp. 290-293. Discusses boiler-furnace changes when change of fuel becomes necessary due to want of supply, strikes, etc., to maintain economic operations.

Losses. Combustion of Coal in Boiler Furnaces, M'Kean Maffitt. Am. Water Works Assn.—Jl., vol. 10, no. 2, Mar. 1923, pp. 230-235. Deals with furnace losses that are preventable.

Maintenance. Boiler Furnace Maintenance, W. H. Gaylord, Jr. Combustion, vol. 8, no. 3, Mar. 1923, pp. 166-168, 7 figs. Economies effected through use of old firebrick for repairing and reconstructing furnace walls and arches.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 136

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co.

Castings, Brass
Du Pont Engineering Co.
* Edward Valve & Mfg. Co.

Castings, Die-Molded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Heavy
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
* Cole, R. D. Mfg. Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Royersford Fdry. & Mch. Co.
* U. S. Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)
* Edward Valve & Mfg. Co.

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Vogt, Henry Machine Co.

Castings, Steel
* Falk Corporation
Link-Belt Co.
Mackintosh-Hemphill Co.

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
Chain Belt Co.
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corp'n

Charging Machines
Whiting Corp'n

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Cloth, Rubber
* Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works
Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Elect. Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring (Metal)
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
Novo Engine Co.
* Titusville Iron Works Co.
Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* U. S. Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.
* Simplex Valve & Meter Co.

Converters, Steel
Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
* Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.
Link-Belt Co.

Conveyors, Ice
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Coupling, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falk Corporation
* Fawcus Machine Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
* Medart Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Locomotive
* Brown Hoisting Machinery Co.
Link-Belt Co.
Whiting Corp'n

Cranes, Locomotive (Crawler)
Link-Belt Co.

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Types. New Types of Furnaces in Great Britain, C. H. S. Tupholme. Combustion, vol. 8, no. 3, Mar. 1923, pp. 182-185, 5 figs. Describes Superheat, Turbine, and Gallagher & Crompton furnaces; tables giving results of tests carried out.

BOILER OPERATION

Economical. Determining Boiler Operating Factors, D. C. Hess. Steam, vol. 31, no. 3, Mar. 1923, pp. 65-69, 8 figs. Factors in economical operation of boiler plants equipped with underfeed stokers; determining combined efficiency. See also Black Diamond, vol. 70, no. 11, Mar. 17, 1923, pp. 296-297, 8 figs.

Efficiency. Determination of Boiler Operating Factors, D. C. Hess. Ry. Mech. Engr., vol. 97, nos. 3 and 4, Mar. and Apr. 1923, pp. 177-179 and 239-241, 8 figs. Methods of checking boiler-room efficiency. Calculating combined efficiency of boiler, furnace and grate.

Determination of Kind of Prime Mover, Installation and Operation of Boilers (Bestimmung der Art der Kraftmaschinen; sowie die Aufstellung und der Betrieb der Dampfkessel), Wärme- u. Kälte-Technik, vol. 25, nos. 4 and 5, Feb. 15 and Mar. 1, 1923, pp. 29-31 and 37-39. Cost of operation with various kinds of coal; grates and fireboxes; upkeep; feedwater purification; feedwater preheaters; superheaters, insulation, etc.

Factors. Determining Boiler Operating Factors, D. C. Hess. Power House, vol. 16, no. 3, Feb. 5, 1923, pp. 21-24, 8 figs. Methods used to determine essential factors for economical operation of boiler rooms, results of tests, method of calculating combined efficiency of boiler.

BOILER PLANTS

Air Heaters for. Air Heating for Boiler and Industrial Plants. Power Engr., vol. 18, no. 203, Feb. 1924, pp. 45-48, 5 figs. Use of air heaters in place of or in addition to feedwater heaters; arguments in their favor as developed by S. Utting.

Gas and Coal Firing. Steam Boiler Plant with Traveling Grate and Gas Firing. Eng. Progress, vol. 4, no. 3, Mar. 1923, pp. 59-60, 2 figs. Describes installation of boiler plant for use of blast-furnace gas and of coal when gas is not available.

BOILERS

A S M E Code. Work of A S M E Boiler Code Committee. Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 261-263 and 273, 1 fig. Modifications of revisions; new revision, 1923.

Electrically Heated. Electric Boilers (Les Chaudières électriques), M. Bergeon. Houille Blanche, vol. 22, no. 73-74, Jan.-Feb., 1923, pp. 29-23. Resistance, induction, and electrode boilers for high tension, and advantages of third type; comparison with coal-fired boilers; uses.

Feed Piping. Boiler Feed Piping, Charles L. Hubbard. Domestic Eng. (Chicago), vol. 102, no. 10, Mar. 10, 1923, pp. 461-464, 10 figs. Installation of boiler feed piping; rules for determining pipe sizes; diagrams and practical data on subject.

Locomotive. See LOCOMOTIVE BOILERS.

Marine. See MARINE BOILERS.

Settings. Boiler Settings for Economical Steaming, Zuce Kogan. Power Plant Eng., vol. 27, no. 7, Apr. 1, 1923, pp. 361-365, 16 figs. Theories of design.

Upper Flue. The So-Called Upper Flue of Boilers (Ueber den sogenannten Oberzug der Dampfkessel), Martin Geiger. Zeit. des Bayer. Revisions-Vereins, vol. 27, no. 4, Feb. 28, 1923, pp. 30-31. Advantages and disadvantages of top flue.

Waste-Heat. Waste Heat Boiler. Practical Engr., vol. 67, no. 1882, Mar. 22, 1923, p. 159, 1 fig. on supp. plate. Describes Krike fire-tube boiler, made by Spencer Bonecourt, Ltd., Hitchin, Eng.; outstanding characteristics are great length of tubes as compared with their diameter, and high velocity of gases through them.

Waste-Heat Boilers (Abhitzekessel), H. Petersen. Gas u. Wasserfach, vol. 66, no. 6, Feb. 10, 1923, pp. 81-84, and (discussion) 84-85, 1 fig. Design of boiler developed by author, which permits rapid circulation of water in boiler. Paper read before German Soc. of Gas & Hydraulic Engrs.

BOILERS, WATER-TUBE

Care and Operation. Care and Operation of Water Tube Boilers. Can. Shipg. & Mar. Eng. News, vol. 13, no. 3, Mar. 1923, pp. 8-9. Precaution and care necessary from safety and economical standpoint both while operating and overhauling, also means of increasing boiler efficiency.

The General Management and Working of Water-Tube Boilers in Merchant Ships. Mar. Engr. & Naval Architect, vol. 46, nos. 545 and 546, Feb. and Mar. 1923, pp. 73-74 and 112-113. Need for careful firing; advantages of water-tube boilers; tubes; feed-water and feeding; addition of lime; care of boilers after use; examination.

Faults in Construction. Faults in Construction of Water-Tube Boilers (Konstruktionsmangel bei Wasserrohrkesseln?), R. Schirmer. Wärme, vol. 46, no. 2, Jan. 12, 1923, pp. 15-18, 14 figs. Discusses uneven heat transmission as a cause of damage to boilers; examples of vertical tube boilers; complete water circulation.

Oil-Burning. Yarrow Water-Tube Boiler with Kermode System of Oil-Firing. Engineering, vol. 115, no. 2988, Apr. 6, 1923, pp. 430-431, 1 fig. Boiler has 2000 sq. ft. of heating surface and working pressure of 200 lb. per sq. in.; fitted to fire and salvage boat; burners are of pressure-atomizing type.

Vertical. The Humboldt Vertical Tube Boiler (Der Humboldt-Steilrohrkessel), W. Alberts. Wärme, vol. 46, no. 7, Feb. 16, 1923, pp. 69-71, 3 figs. Advantages of vertical tube boilers; evaporation test of Humboldt plant.

BRASS

Season Cracking. Further Studies in Season-Cracking and Its Prevention. The Removal of Internal Stress in 60:40 Brass, S. Beckinsale. Inst. of Metals advance paper, no. 3, for meeting Mar. 7-8, 1923, 12 pp., 2 figs. Investigation of methods of removal of internal stress in 60:40 brass by measurement of reduction of internal stress by specified treatments and by observing behavior of treated articles in mercurious nitrate solution. See also Metal Industry, vol. 22, no. 10, Mar. 9, 1923, pp. 223-227, 2 figs.

C

CAMSHAFTS

Generating Machine. A Novel Camshaft Generating Machine. Eng. Production, vol. 6, no. 127, Apr. 1923, pp. 235-236, 2 figs. Hotchkiss-Taylor camshaft shaping machine developed for cutting cams on shafts made from bar or drop forgings.

CAR DUMPERS

Car-Dumping Machine. Philadelphia & Reading Car Dumping Machine. Ry. Jl., vol. 29, no. 3, Mar. 1923, pp. 23-24, 1 fig. 120-ton machine to be erected at Port Richmond terminal; plant will consist of 900-ft. pier, with car-dumping machine, power plant, thawing plant, car haulage, mechanical trimming and boat haulage, and machines designed to deliver coal direct from cars to vessels.

Rotary. The Field for the Rotary Car Dumper, Sheldon Smillie. Coal Industry, vol. 6, no. 4, Apr. 1923, pp. 209-212, 7 figs. Rotary car dumper permits use of solid end car, with its greater strength, increased capacity and less leakage on haulage ways; especially adapted for dumping trip of cars in bin.

CAR WHEELS

Chilled-Iron. An Investigation of the Properties of Chilled Iron Car Wheels, J. M. Snodgrass and F. H. Guldner. University of Ill. Bul., vol. 20, no. 3, Apr. 16, 1923, Eng. Experiment Station, Bul. no. 135, 97 pp., 62 figs. Strains due to brake application, coefficient of friction and brake-shoe wear.

Manufacture. The Manufacture of Railway Steel Tires and Wheels from Individual Ingots, Lawford H. Fry. Baldwin Locomotives, vol. 1, no. 4, Apr. 1923, pp. 27-34, 15 figs. Processes developed by Standard Steel Works Co. of Burnham, Pa.

Removal. Methods and Equipment for Removing Wheels, C. W. Squier. Elec. Ry. Jl., vol. 61, no. 11, Mar. 17, 1923, pp. 447-452, 15 figs. Study, covering 50 shops, of various methods employed in pressing off wheels to bring out function of holes in gear blank, looking toward standardization of number, size and location of these holes.

CARS, FREIGHT

Concrete. Reinforced-Concrete Freight Cars (Die Eisenbahnguterwagen aus Eisenbeton), Max Gensbaur. Beton u. Eisen, vol. 22, no. 5, Mar. 5, 1923, pp. 67-69, 5 figs. Details of 24 freight cars which have traveled 85,814 km.; it is proposed to run experimental train for further tests.

CARS, PASSENGER

Steel. De Luxe Passenger Cars for Chinese Railway. Ry. Age, vol. 74, no. 18, Apr. 7, 1923, pp. 913-914, 5 figs. Also Ry. Mech. Engr., vol. 97, no. 4, Apr. 1923, pp. 217-218, 5 figs. Modern steel equipment conforming to American practice built for Tientsin-Pukow line.

CASE HARDENING

Carburizing Materials. Selection, Test and Use of Carburizing Materials. Can. Machy., vol. 29, no. 10, Mar. 8, 1923, pp. 16-17. Recommended practice of Am. Gear Manufacturers' Assn.; different steels have varying intensity of carbon absorption; high carbon content for camshaft work.

Methods. Methods of Case-Hardening. West. Machy. World, vol. 14, no. 3, Mar. 1923, pp. 96-97, 1 fig. Method of producing case-hardening material of commercial form consists of mixing coking coal or other strong coking materials, with appropriate amounts of chemical energizers, heating this mixture and crushing and screening resulting mass of compound coke.

CAST IRON

Briquetting Refuse. Briquetting Cast-Iron Borings. Iron & Coal Trades Rev., vol. 106, no. 2871, Mar. 9, 1923, p. 341, 2 figs. Describes machine known as "President" press for briquetting iron borings. See also Foundry Trade Jl., vol. 27, no. 343, Mar. 15, 1923, pp. 222-223, 1 fig.

Chemical Constituents. Notes on Grey Cast Iron, A. E. MacRae Smith. Foundry Trade Jl., vol. 27, no. 346, Apr. 5, 1923, pp. 270-272. Indication of influence of chemical constituents of cast iron with view to clearer understanding of grading of pig iron and mixing of irons by analysis.

Dissolved Gases, Influence of. The Influence of Dissolved or Occluded Gases in Cast-Iron. Foundry Trade Jl., vol. 27, no. 343, Mar. 15, 1923, pp. 209-211. Summary of existing knowledge on influence of dissolved gases. Gases present in cast iron; influence of dissolved gases on properties and soundness; oxygen in cast iron; influence of hydrogen and nitrogen.

Microscopic Examination. The Examination and Photography of Cast Iron under the Microscope, Colin Gresty. Foundry Trade Jl., vol. 27, no. 346, Apr. 5, 1923, pp. 273-279, 19 figs. Survey of main features of apparatus and methods of manipulation.

Physics of. Physics of Cast Iron, E. Adamson. Foundry Trade Jl., vol. 27, no. 345, Mar. 29, 1923, pp. 257-260, 4 figs. Author seeks to elucidate dominating influence of condition of carbon on molecular physics of cast iron. See also criticism of above article by J. E. Hurst, pp. 261-262, 1 fig.

Properties. Wear and Anti-Friction Qualities of Cast Iron, J. E. Hurst. Can. Foundryman, vol. 14, no. 2, Feb. 1923, pp. 20-21 and 29. Acknowledged to be best material from point of view of wearing and general running properties.

CASTING

Centrifugal. Centrifugal Casting—The Harbinger of a New Era in the Steel Industry, Leon Cammen. Raw Material, vol. 6, no. 4, Apr. 1923, pp. 138-143. Its effect upon present production methods in steel industry; wastefulness of ingot as intermediate steel product; patent situation of centrifugal casting; applications outside of steel industry.

CENTRAL STATIONS

Comines, France. The Central Electric Generating Station at Comines. Engineer, vol. 135, nos. 3506 and 3507, Mar. 9 and 16, 1923, pp. 249-251 and 277-279, 18 figs. partly on p. 262. Details of new station with three generating units each of 25,000 kw. capacity; boiler house and coal-handling arrangements; auxiliary plant; water supply and steam pipes; transformer house; transmission lines; pumping plant; distribution and substations.

Economy. Power Production in Relation to Ultimate Values, A. Hugh Seabrook. Elec. Ry. & Tramway Jl., vol. 48, no. 1174, Mar. 9, 1923, pp. 102-104. Factors in power-station economy; states that cost of power production is only one factor and that all circumstances should be taken into account. From address before Bradford Eng. Soc.

Gennevilliers, France. Gennevilliers, France. Large Thermoelectric Power Station at Gennevilliers (La grande usine thermoélectrique de Gennevilliers), Marcel Blondin. Revue Générale de l'Electricité, vol. 13, nos. 8 and 9, Feb. 24 and Mar. 3, 1923, pp. 283-302 and 349-369, 45 figs. Linking-up of power stations in Paris district; boiler houses and equipment; turbo-generators; machinery buildings; safety devices; switchboard arrangements; transformers; current distribution and transmission system; cables and insulation; transmission line poles, etc.

Leicester, England. The Leicester Central Generating Station, L. C. Kemp. English Elec. Jl., vol. 2, no. 3, Jan. 1923, pp. 109-129, 28 figs. Details of central station of city of Leicester; general arrangement of power station; buildings and foundations; coal- and ash-handling plant; boiler-house plant; engine-room plant; circulating water system and screening plant; switchgear and transformers.

Output, 1922. Eight Systems with Output of 1,000,000,000 Kw. in 1922. Elec. World, vol. 81, no. 14, Apr. 7, 1923, pp. 802-805. Survey indicates that in 1922, 92 companies of United States and Canada reported individual outputs exceeding 100,000,000 kw-hr. Data on output and peak load of largest generating and distributing systems in United States and Canada.

Waste-Steam Utilization. Experience in Steam Power Works (Erfahrungen mit Heizkraftwerken mit Fernversorgung), K. Heilmann. Wärme, vol. 46, no. 8, Feb. 23, 1923, pp. 85-86. Discusses cases of connecting central stations to hospitals, baths, factories, etc., to utilize surplus and waste heat and power.

Wind-Driven. Proposals for D. C. Central Station Driven by Wind Power (Vorschlage zu einer durch Windkraft betriebenen, selbstandigen Gleichstromzentrale), R. Bosselmann. Elektrische Kraftbetriebe u. Bahnen, vol. 20, no. 23, Dec. 10, 1922, pp. 261-263, 2 figs. Describes new regulating arrangement for which successful operation is claimed.

CLUTCHES

Friction. Friction Clutch for Oil-Engine Power Transmission. Motorship, vol. 8, no. 3, Mar. 1923, pp. 198-200, 7 figs. Details of Frauenfelder flexible clutch as used on U. S. submarines.

COAL

Combustibility. The Combustibility of Coal (Ueber die Verbrennlichkeit der Kohle), A. Korevaar. Stahl u. Eisen, vol. 43, no. 13, Mar. 29, 1923, pp. 431-435, 2 figs. New ideas on the reactions in gas producers; influence of quality of coal on volume of combustion zone; volume and temperature of combustion zone; method for determination of combustibility of coal.

Recovery from Slag. Magnetic Separation of Coal from Slag, F. A. Brackmann. Iron Age, vol. 111, no. 12, Mar. 22, 1923, pp. 828-829, 6 figs. New German patent process recovers 80 per cent of fuel from slag and ashes and yields fuel with 75 per cent of original heating value.

Spontaneous Combustion, Prevention of. How to Prevent Spontaneous Combustion in Coal Piles, O. P. Hood. Fire & Water Eng., vol. 73, no. 12, Mar. 21, 1923, pp. 495-496, 499 and 516, 8 figs. Practical suggestions for fire and water-works departments on problem; conditions which are favorable for spontaneous ignition of coal in storage; bituminous more subject to trouble than anthracite.

COAL HANDLING

Pneumatic Plant. Coal Handling by Suction at the Brimsdown Power Station of the North Metropolitan Electric Power Supply Company. Iron & Coal

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 136

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Roll
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cupolas
* Bigelow Co.
Northern Engineering Works
Whiting Corp'n

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
* Whitney Mfg. Co.

Cylinders Rebored
* Hooven, Owens, Rentschler Co.

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Diaphragms, Rubber
United States Rubber Co.

Die Castings
(See Castings, Die Molded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Thread Cutting
Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Drafting Room Furniture
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Drawing Instruments and Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Lidgerwood Mfg. Co.
* Morris Machine Works

Dredging Sleeve
United States Rubber Co.

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.
* Ingersoll-Rand Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
* Johns-Manville (Inc.)
Manufacturing Equip. & Engrg. Co.

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.
Link-Belt Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Philadelphia Drying Machy. Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
Clarage Fan Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.

Dyeing Machinery
Philadelphia Drying Machy. Co.

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Electrical Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Electrical Supplies
* General Electric Co.
* Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Elevators, Electric
Northern Engineering Works

Elevators, Hydraulic
Whiting Corp'n

Elevators, Passenger and Freight
Northern Engineering Works

Elevators, Pneumatic
Whiting Corp'n

Elevators, Portable
Link-Belt Co.

Elevators, Telescopic
Link-Belt Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.

Engine Stops
* Schutte & Koerting Co.

Engines, Blowing
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Novo Engine Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Westinghouse Electric & Mfg. Co.

Engines, Gasoline
Midwest Engine Corp'n
Novo Engine Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
Clyde Iron Works Sales Co.
* Hooven, Owens, Rentschler Co.
* Lidgerwood Mfg. Co.
* Morris Machine Works

Engines, Kerosene
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
Sterling Engine Co.
* Ward, Chas. Engineering Wks.
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
* Ingersoll-Rand Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
Otto Engine Works
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
Midwest Engine Corp'n
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Morris Machine Works
Sterling Engine Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Ridgway Dynamo & Engine Co.
* Tittsville Iron Works Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Leffel, James & Co.
* Troy Engine & Machine Co.
* Westinghouse Electric & Mfg. Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Vilter Mfg. Co.

Engine, Steam, High Speed
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Vilter Mfg. Co.

Engines, Steam, Throttling
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
Harrisburg Fdry. & Mach. Wks.
* Ridgway Dynamo & Engine Co.
Stumpf Una-Flow Engine Co. (Inc.)

Engines, Steam, Variable Speed
* Brownell Co.
Harrisburg Fdry. & Mach. Wks.

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Exhaust Heads
Hoppes Mfg. Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
Clarage Fan Co.

Exhausters, Gas
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Extractors, Centrifugal
Tolhurst Machine Works

Extractors, Oil and Grease
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Machy. Co.

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Fuller Lehigh Co.
* Smidth, F. L. & Co.

Filters, Gravity
* Permutit Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Graver Corp'n
* Permutit Co.

Filters, Water
Elliott Co.
* Graver Corp'n
* H. S. B. W. Cochrane Corp'n
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* Graver Corp'n
* H. S. B. W. Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* U. S. Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Steel
* Crane Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Flanges
* American Spiral Pipe Works
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt Henry, Machine Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Trades Rev., vol. 106, no. 2873, Mar. 23, 1923, pp. 426-427, 5 figs. New pneumatic plant performs three distinct handling operations by means of one receiver and vacuum pump.

COLD STORAGE

Plants. The Swift Slaughter House and Cold Storage Plant at La Plata (Una visita al Frigorifico Swift de La Plata), C. Dedlow. Ingeniería, vol. 27, no. 2, Feb. 1923, pp. 74-82, 10 figs. Describes layout, buildings, and equipment for dealing with up to 10,000 animals per day.

Warehouse. A New and Modern Cold Storage Warehouse. Ice & Refrigeration, vol. 64, no. 3, Mar. 1923, pp. 191-196, 8 figs. New plant of Kansas City Cold Storage & Warehouse Co.; ice-making equipment; room piping; elevator equipment; refrigerating machinery; insulating doors and ice chutes.

CONDENSERS, STEAM

Tubes. Condenser Tubes: Their Manufacture and Specifications. Raw Material, vol. 6, no. 3, Mar. 1923, pp. 97-103, 13 figs. Practice of Chase Metal Works, Waterbury, Conn. Manufacturing processes; causes of failures; corrosion; control of final grain size; use and care of tubes.

CONNECTING RODS

Duralumin. Machining Duralumin Connecting-Rods. Fred H. Colvin. Am. Mach., vol. 58, no. 9, Mar. 1, 1923, pp. 321-324, 7 figs. Coming to size for grinding, drilling, reaming and broaching operations; inserting and swaging babbitt bearings; boring large ends for selective assembly.

Machining. Indexing Fixtures Allow Continuous Cutting and Reduce Labor Needs. J. Edward Schipper. Automotive Industries, vol. 48, no. 15, Apr. 12, 1923, pp. 828-831, 10 figs. By use of indexing fixtures, Northway Motors Co. has effected direct economies in manufacture of connecting rods for G. M. C. truck engine.

CONVEYORS

Belt. Half-Mile Conveyor System for Transporting Hog Fuel. W. A. Scott. Belting, vol. 22, no. 2, Feb. 1923, pp. 21-24, 3 figs. Methods and equipment employed in delivering hog fuel to boilers at Vancouver, Wash., plant of Crown Willamette Paper Co., involving operation of barges, a clam-shell 2-yd. bucket and 2135 ft. of conveyors.

Cable. New Auxiliaries for Conveying in Mountainous Mining Districts (Neuzeitliche Hilfsmittel zum Materialtransport bei Tiefbauten im Hochgebirge). Friedrich Riedig. Fördertechnik u. Frachtverkehr, vol. 17, no. 3, Feb. 2, 1923, pp. 30-32, 6 figs. Deals with cableways, cable cranes, conveying by cars on tracks controlled by cables, inclined elevators, etc.

Gas-Works. Mechanical Conveying Plant for Gas Works. Hartland Seymour. Gas Engr., vol. 39, no. 563, Mar. 1923, pp. 57-59, 5 figs. Describes various types of conveyors.

COOLING LIQUIDS

Spray Coolers. Heat Exchange in Spray Coolers (Der Warmeaustausch am Berieselungskuhler). Wilhelm Nusselt. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 9, Mar. 3, 1923, pp. 206-210, 6 figs. Heat-transmission coefficient of spray cooler for heat exchange between cooling surface and spraying liquid.

COOLING TOWERS

Design. Cooling Towers. Edwin Burhorn. Refrig. Engg., vol. 9, no. 9, Mar. 1923, pp. 275-276 and 280. Suggests important factors in successful design.

COPPER

Hardness. The Hardness of Annealed Copper. A. L. Norbury. Am. Inst. of Metals advance paper, no. 15, for meeting Mar. 7-8, 1923, 16 pp., 8 figs. Research to obtain more definite expression of Brinell hardness of copper.

COPPER ALLOYS

Copper-Aluminum-Nickel. The Ternary System Copper-Aluminum-Nickel. Charles R. Austin and A. I. Murphy. Inst. of Metals advance paper, no. 2, for meeting Mar. 7-8, 1923, 41 pp., 40 figs. Cooling curves were taken on 250 alloys covering whole ternary diagram, determination being most numerous in area 0 to 20 per cent aluminum and 0 to 20 per cent nickel; from data obtained liquidus surface for complete system has been established.

Copper-Tin. The Density and the Hardness of the Cast Alloys of Copper with Tin. Harold Heape. Inst. of Metals advance paper, no. 13, for meeting Mar. 7-8, 1923, 19 pp., 5 figs. Author concludes that algebraic sum of changes in volume, occurring on alloying and during subsequent solidification, is in every case negative, that is, results in contraction; it is not possible to determine exact relationship of density and hardness by means of determinations made on cast alloys; it is difficult to obtain sound castings with copper-rich alloys. See also (abstract) in Metal Industry, vol. 22, no. 10, Mar. 9, 1923, pp. 227-230, 5 figs.

Hardness. The Hardness of Certain Copper α-Solid Solutions. A. L. Norbury. Am. Inst. of Metals advance paper, no. 16, for meeting Mar. 7-8, 1923, 13 pp., 13 figs. Measurement of hardness of alloys of copper containing various percentages of aluminum, silicon, manganese, nickel, zinc, silver and tin, in solid solution.

COST ACCOUNTING

Estimating. How to Get Reliable Cost Estimates. Thomas W. Howard. Factory, vol. 30, no. 4, Apr. 1923, pp. 410-412, 440, 442 and 444, 1 fig. Describes method employed in author's plant.

Factory. Double-Entry Bookkeeping in the Factory as Standard and Guide for Its Organization (Doppelte Buchführung durch die Fabrik als Massstab und Richtschnur für ihre Organization). W. Waldschmidt. Werkstattstechnik, vol. 17, no. 5, Mar. 1, 1923, pp. 134-138, 1 fig. Discussion of propositions for factory-accounting system, presented by Ernest Just in same journal.

Quantity Production and Its Effect on Cost. H. E. King. Management Eng., vol. 4, no. 4, Apr. 1923, pp. 269-271, 3 figs. Points out that standard methods should be based on labor cost analysis.

Seven Propositions for the Organization of a Practical Factory-Accounting System (Sieben Thesen zur Einführung einer naturlichen Abrechnungspraxis in Fabrikbetrieben). Ernest Just. Werkstattstechnik, vol. 17, no. 5, Mar. 1, 1923, pp. 130-134. Theses presented before Research Soc. for Sci. Management, and explanation and discussion of these theses by J. F. Schar, Georg Schlesinger and A. Wallichs.

Foundries. A Practical Cost System for the Small or Medium-Sized Foundry. Peter L. Hill. Foundry Trade Jl., vol. 27, nos. 342 and 343, Mar. 8 and 15, 1923, pp. 190-193 and 215-216, 1 fig. Describes system based on practical experience of foundry conditions. Plea for standard system.

Standard Costs. Standard Costs. Arthur Lazarus, Jr. of Accountancy, vol. 35, no. 4, Apr. 1923, pp. 247-252. Author claims that standard costs, when based upon necessary elemental data, provide excellent cost short-cuts, but are not designed to do work of planning, engineering or production departments.

CRANES

Electromagnetic. Magnetic Cranes With Collectors (Magnetkrane mit Sammelgefäss). Hubert Hermanns. Werkstattstechnik, vol. 17, no. 3, Feb. 1, 1923, pp. 67-69, 8 figs. Practical examples of application of collectors, resulting in increase in efficiency and reduction in power consumption.

Steam-Derrick. 70-Ton Portable Steam Derrick Crane. Engineering, vol. 115, no. 2988, Apr. 6, 1923, pp. 426-427, 10 figs. partly on p. 425. Features of crane constructed for handling of heavy concrete castings.

Trailer. 15-Cwt. Trailer Crane. Engineering, vol. 115, no. 2985, Mar. 16, 1923, pp. 331-332, 5 figs. Portable crane arranged to be used as trailer in connection with type of battery truck now commonly used in workshops, warehouses, etc.

Traveling, Electric. Operating and Maintenance Practice for Electric Traveling Cranes. B. Hantman. Indus. Engr., vol. 81, no. 4, Apr. 1923, pp. 176-180 and 225, 8 figs. Describes crane inspection and repair procedure, with method of reducing number of spare parts carried in stock, followed by Westinghouse Elec. & Mfg. Co.; some ways to prevent trouble and prolong life of parts subject to hard service.

Wind-Pressure Hazard. Wind Pressure Is Bridge Hazard. C. O. Burton. Iron Trade Rev., vol. 72, no. 15, Apr. 12, 1923, pp. 1090-1093, 6 figs. Ore, coal and dock cranes often threatened with destruction during severe storms; new type anemometer with recorder shows whether operation is safe or unsafe; automatic control.

CRANKSHAFTS

Balancing. Method of Balancing High-Speed Crankshafts. C. Norman Fletcher. Can. Machy., vol. 29, no. 11, Mar. 15, 1923, pp. 23 and 40, 3 figs. Graphical explanation of balancing methods; static balance and dynamic unbalance; effect of speed variation.

Forging. Forging a Heavy Crankshaft. H. A. Charles. West. Machy. World, vol. 14, no. 3, Mar. 1923, pp. 87-88, 4 figs. Equipment and methods used at Pennington Forge Plant to manufacture crankshaft for 350-hp. 6-cylinder marine engine.

Modern Practice of Forging Engine Crankshafts. Walter Rowland. Can. Machy., vol. 29, no. 11, Mar. 15, 1923, pp. 26-27, 5 figs. Dies used in drop forging; working different steels; effect of temperature on grain; heat treatment.

Manufacture. The Manufacture of Crankshafts. Chas. S. Pettit. Automobile Engr., vol. 13, no. 174, Mar. 1923, pp. 75-77, 7 figs. Description of proposed procedure and equipment.

CUPOLAS

Blowing Methods. Methods of Cupola Blowing Compared. E. A. Roper. Foundry Trade Jl., vol. 27, no. 342, Mar. 8, 1923, pp. 196-197, 1 fig. Difference between fan and Roots blower; comparison with regard to volume and pressure, application, cupola design and resistance, control, efficiency and cost.

Cathode. A Cathode Cupola Furnace Plant (Eine neuzeitliche Kupolofenanlage). Alfred Mesker. Zeit. für die gesamte Giessereipraxis, vol. 44, nos. 7-8, Feb. 24, 1923, pp. 46-47, 3 figs. Describes Lebert Bröse type with special air distribution.

Steel-Scrap Melting in. Throws Light on Steel Melting. G. Muntz. Iron Trade Rev., vol. 72, no. 12, Mar. 22, 1923, pp. 880-881. Experiments made under stress of war necessity result in new procedure for melting steel scrap in cupola; priming charge of pig iron deemed imperative to maintain fluidity.

CUTTING METALS

Electric Arc. Cutting Metals with the Electric Arc. A. M. Candy. Iron Age, vol. 111, no. 16, Apr. 19, 1923, pp. 1098-1099, 7 figs. Hourly rate and cost of cutting; use of methods for scrapping wrecked or discarded steel freight cars; non-ferrous uses.

CUTTING-OFF MACHINES

Types. The Cutting-off Problem. British Machine Tool Eng., vol 2, nos. 17 and 20, Sept.-Oct. 1922 and Mar.-Apr. 1923, pp. 544-548, 6 figs. and 611-615 and 625, 5 figs. Sept.-Oct.: Technical features of saws, rotary cutting-off machines, reciprocating of slotter types, and shearing and cropping machines. Mar.-Apr.: Data to aid in selecting correct cutting-off equipment in relation to work involved.

CYLINDERS

Fins. Research Shows How to Increase Cylinder Fin Efficiency. C. B. Dicksee. Automotive Industries, vol. 48, no. 14, Apr. 5, 1923, pp. 768-772, 11 figs. Straight tapered section easy to produce and is quite light; 7-deg. taper considered best; heat-handling capacity for tapered cast-iron and sheet-steel fins of various proportions.

Molding. Molding Franklin Cylinders. Fred H. Colvin. Am. Mach., vol. 58, no. 13, Mar. 29, 1923, pp. 465-467, 9 figs. Coreboxes and cores for various parts; inserting cooling strips or vanes; assembling cores into complete mold.

Reboring. Reboring Cylinders in Situ (Zylinderausdrehen an Ort und Stelle). Samuel Gans. Werkstattstechnik, vol. 17, no. 4, Feb. 15, 1923, pp. 97-99, 11 figs. Describes apparatus used for reboring locomotive cylinders without taking it from machine, which can be applied to any cylinder; explains operation in detail.

D

DIE CASTING

Developments. Historical Development of Die Casting and Modern Production Methods (Geschichtliche Entwicklung des Pressgusses und neuzeitliche Pressgussherstellung). Harry Baclesse. Giesserei-Zeitung, vol. 20, no. 4, Jan. 23, 1923, pp. 39-44, 3 figs. Historical review; American experiences; proper arrangement of die-casting plant; most useful die-casting alloys.

Machines. Types of Die-casting Machines. Charles Pack. Machy. (N. Y.), vol. 29, no. 8, Apr. 1923, pp. 629-631, 5 figs. Deals with plunger and compressed-air type; the gooseneck machine; machines for large castings.

DIES

Combination. Combination Dies for Sheet-Metal Parts. C. E. Stevens. Am. Mach., vol. 58, no. 15, Apr. 12, 1923, pp. 533-536, 7 figs. Examples of work in which several operations were completed in one set of press tools; data on construction and operation.

Die Cutting. A Key to Many Industries. Robert G. Skerrett. Sci. Am., vol. 128, no. 4, Apr. 1923, pp. 246-247, 5 figs. Deals with technique of die cutting and its place in factories; reducing and duplicating machines.

DIESEL ENGINES

Cement Mills. Diesel Engines in a Portland Cement Plant. C. M. Carman. Power Plant Eng., vol. 27, no. 8, Apr. 15, 1923, pp. 417-420, 2 figs. Operating results secured by Western States Portland Cement Co. favorable to Diesel type of prime mover.

Double-Acting. Double-Acting Motors of 7000 Horse-Power. Times Trade & Eng. Supp., vol. 12, no. 247, Mar. 31, 1923, p. 62. Individual oil engines built by Burmeister & Wain, Copenhagen, to be installed in the Dumana, a 17,000-ton motor liner.

Exhaust-Gas Utilization. Utilization of Waste Exhaust-Gases. Motorship, vol. 8, no. 3, Mar. 1923, pp. 212-213, 1 fig. Method of economically heating heavy fuel oil developed by Row & Davis.

Marine Auxiliaries. Diesel-Engines on United States Battleship. Motorship, vol. 8, no. 4, Apr. 1923, pp. 278-279, 3 figs. Details of installation of Busch-Sulzer Diesel engines, Gen. Elec. motors and waste-heat boilers on dreadnought Maryland.

Mechanical-Injection. Union Diesel Enters the Field. Pac. Mar. Rev., vol. 20, no. 3, Mar. 1923, pp. 152-154, 2 figs. Details of mechanical-injection Diesel engine constructed by Union Gas Engine Co.

Neptune-Polar. New Design of Neptune-Polar Two-Cycle Engine. Motorship, vol. 8, no. 3, Mar. 1923, pp. 192-195, 9 figs. Built by Swan Hunter & Wigham Richardson; six-cylinder, reversible single-acting crosshead type, designed to burn heavy-oil fuel; stepped-piston design; 1400 i.hp. at 125 r.p.m.

New York-Werkspoor. Another Americanization of an European Oil-Engine. Motorship, vol. 8, no. 4, Apr. 1923, pp. 255-262, 18 figs. Details of New York-Werkspoor Diesel marine engine, a 6-cylinder unit of 2000 i.hp. at 110 r.p.m.

Plant Costs. Figuring Diesel Plant Costs. P. M. Thayer. Power Plant Eng., vol. 27, no. 7, Apr. 1, 1923, pp. 372-375, 2 figs. Points out that fixed charges and operating costs should be separated.

Sulzer. Twenty Years of Diesel Engine Building. L. J. Le Mesurier. Motorship, vol. 8, no. 4, Apr. 1923, pp. 290-292, 3 figs. Record of development of Sulzer 2-cycle oil engine, i.e., from 1893. Extracts from paper read before Instn. Engrs. & Shipbldrs. in Scotland.

Tosi. Diesel-Tosi Engines. Indian Industries & Power, vol. 20, no. 5, Jan. 1923, pp. 149-151, 2 figs. Some details of latest type of engine developed by Franco Tosi, of Legnano, Italy, ranging in sizes of 50 to 3000 hp. per unit, 4-cycle type.

Two-Cycle Marine. Practical Results of Two-Stroke-Cycle Engine of the Motor Tanker, Zoppot (Die bisherigen Betriebsergebnisse der Zweitaktmotoren des Motortankschiffes "Zoppot"). W. Laudahn. Schiffbau, vol. 24, no. 15-16, 17 and 18, Jan. 10-17

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 136

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flooring, Rubber
United States Rubber Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Furnace & Burner Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Foundry Equipment
Northern Engineering Works
Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Whiting Corp'n

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Detroit Electric Furnace Co.
Kenworthy, Chas F. (Inc.)

Furnaces, Forging
Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
Kenworthy, Chas F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
Detroit Electric Furnace Co.
* General Electric Co.
Whiting Corp'n

Furnaces, Non-Ferrous
Detroit Electric Furnace Co.

Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co.
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
* Johns-Manville (Inc.)

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Glasses
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Gages, Differential Pressure
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Draft
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Liquid Level
* Bristol Co.
* Lunkenheimer Co.
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
* Norma Co. of America

Gages, Pressure
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gages, Water Level
* Bristol Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge and Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gas Analysis Apparatus
* Precision Instrument Co. (Inc.)

Gas Collectors
* Precision Instrument Co. (Inc.)

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Gasoline
Texas Co.

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.

Gears, Cut
Brown, A. & F. Co.
Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Philadelphia Gear Works
* Poole Engrg. & Mch. Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Herringbone
* Falk Corporation

Gears, Machine Molded
Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.
Philadelphia Gear Works

Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Falk Corporation
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.
Link-Belt Co.
* Poole Engrg. & Mach. Co.
* Westinghouse Electric & Mfg. Co.

Gears, Worm
Chain Belt Co.
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Westinghouse Electric & Mfg. Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Kieley & Mueller (Inc.)

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co.

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Grinding Machinery
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Guards (Electric Lamp)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Franklin Machine Co.
Long & Allstatter Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hangers, Shaft
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball Bearing)
* Hyatt Roller Bearing Co.
* S K F Industries (Inc.)

Hangers, Shaft (Roller Bearing)
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mach. Co.

Hard Rubber Products
United States Rubber Co.

Hardening
* American Metal Treatment Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

Heaters, Water Supply
Herbert Boiler Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

24 and 31, 1923, pp. 231-238, 255-258 and 276-280, 21 figs. Gives main dimensions of ship and details of engines, built by Fried. Krupp Corp. Germania Docks.

Working Losses. Investigations of Diesel Engines (Untersuchungen an der Dieselmaschine), Kurt Neumann. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 12, Mar. 24, 1923, pp. 279-283, 4 figs. Thermodynamic cycle and working losses.

DRILLING MACHINES

Automatic Feeding Device. Automatic Feeding Device for High-speed Drilling, Charles E. Bernth. Machy. (N. Y.), vol. 29, no. 8, Apr. 1923, pp. 621-622, 2 figs. Details of automatic feed of friction type.

Horizontal Milling and. Horizontal Milling, Drilling and Tapping Machine. Machy. (Lond.), vol. 21, no. 546, Mar. 15, pp. 743-745, 3 figs. Parts drilled on interchangeable lines without use of jigs.

Multiple-Spindle. Multiple Spindle Vertical Drilling Machine. Engineer, vol. 135, no. 3507, Mar. 16, 1923, p. 293, 3 figs. Details of machine made by James Archdale & Co., Birmingham, England.

Vertical. A New Vertical Drilling Machine Development. Brit. Machine Tool Eng., vol. 2, no. 19, Jan.-Feb., 1923, pp. 581-584, 5 figs. Heavy-duty machine applicable to drilling of pieces required in moderately large quantities, built by James Archdale & Co.

DUST

Determination in Air. New Data on Air Dust Determinations, Margaret Ingels. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 2, Mar. 1923, pp. 177-194, 24 figs. Report of further developments in Anderson and Armspach apparatus and results obtained in series of tests.

E

EDUCATION, ENGINEERING

Intelligence Tests. Intelligence Tests for Engineering Students, L. L. Thurstone. Eng. Education, vol. 13, no. 5, Jan. 1923, pp. 263-318, 15 figs. Co-operative investigation to study value of various kinds of examinations, and possible practical usefulness of some new types of examinations for engineering schools; results of which might be expected to bear on provision of entrance requirements and entrance examinations for engineering colleges.

ELECTRIC FURNACES

Acid. Lining Acid Electric Furnaces, J. M. Quinn. Iron Age, vol. 111, no. 16, Apr. 19, 1923, pp. 1101-1102. Various materials which can be used and how to handle them; describes best lining.

Crucible-Shaped. Designs New Electric Furnace, R. Sylvany. Iron Trade Rev., vol. 72, no. 13, Mar. 29, 1923, pp. 952-953. Metal melted in crucible-shaped vessel with only one opening; electrode through roof sheathed to prevent ingress of air; other electrodes placed in lateral lining in hearth.

Heat-Treating. Selection of Electric Furnaces for Steel Treating, C. L. Ipsen. Am. Soc. Steel Treating—Trans., vol. 3, no. 7, Apr. 1923, pp. 720-728, 10 figs. Deals with electric heat treating resistor-type furnaces and their increasing use.

Melting. Electric Furnace Melting Practice, E. G. Stedman. Am. Soc. Steel Treating—Trans., vol. 3, no. 7, Apr. 1923, pp. 740-745 and (discussion) 745-749. Discusses type of equipment, methods of procedure, including laboratory tests and forge and chill tests, used in controlling melting practice; outlines casting, ingot forging, rolling and billet-piercing practice carried out in author's plant; points wherein, in his opinion, electric furnace melting surpasses open-hearth practice.

Practice. Notes on Electric Steel Furnace Practice, Vincent C. Faulkner. Iron & Coal Trades Rev., vol. 106, no. 2873, Mar. 23, 1923, p. 418. Electric steel furnaces in England; underlying principles; tilting mechanism; electrode carriage; care and charging of furnaces. (Abstract.) Translated from paper presented before Assn. Technique de Fonderie.

Resistance. Electrical Resistance Furnaces and Their Uses, Chas. R. Darling. Roy. Soc. of Arts—Jl., vol. 71, no. 3670, Mar. 23, 1923, pp. 324-332 and (discussion) 332-336, 10 figs. Advantages; metal-wound furnaces; carbon resistance furnaces; appliances used in conjunction with resistance furnaces.

Steel. Advantages of Electric Furnace in Steel Making, Ernest W. Cornelius. Can. Machy., vol. 29, no. 13, Mar. 29, 1923, pp. 17-19, 1 fig. Product of more uniform quality; better temperature control; less loss in melting and refining; more frequent heats and smaller molding floors.

Some Random Notes on Electric Steel Furnace Practice, Vincent C. Faulkner. Foundry Trade Jl., vol. 27, no. 345, Mar. 29, 1923, pp. 254-256. Present state of electric steel furnace in England; American progress since war; underlying principles; electrode carriage, economizers; care and charging of furnaces. Translation of paper presented to Assn. Technique de Fonderie.

Types. Methods of Handling Materials in the Electric Furnace and the Best Type of Furnace to Use, Frank W. Brooke. Am. Electrochem. Soc., advance paper, no. 6, for meeting May 3-5, 1923, pp. 71-81, 15 figs. Discusses design of various electric furnaces, such as plain-box type, special-box type, car type, recuperative and continuous furnaces, and refers to their advantages and disadvantages; method of handling material so that uniform temperature and high furnace efficiency may be maintained.

ELECTRIC LOCOMOTIVES

A. C., Control of. Control of A. C. Locomotives (Die Steuerung der Wechselstromlokomotiven), Iwan Dory. Elektrotechnik u. Maschinenbau, vol. 41, no. 4, Jan. 28, 1923, pp. 69-72, 7 figs. Describes types produced by principal electric companies.

Baldwin-Westinghouse. Electric Locomotives for the Norfolk & Western, T. C. Wurtz. Ry. Age, vol. 74, no. 19, Apr. 14, 1923, pp. 945-947, 6 figs. Double cab is carried by vanadium steel side frames with four pairs of drivers in each frame.

New 4000-Hp. Electric Locomotives for N. & W. Ry., T. C. Wurtz. Ry. Rev., vol. 72, no. 15, Apr. 14, 1923, pp. 647-650, 4 figs. New features include cab structure carried by side frames of vanadium steel; four pairs of drivers in single truck per cab; single 1000-hp. motor per jackshaft; oil-insulated forced-cooled transformer, etc.

New 180-Ton Passenger Locomotives for the New Haven, W. J. Clardy. Elec. Ry. Jl., vol. 61, no. 10, 1923, p. 412. One locomotive will be capable of hauling 900-ton trailing load, or 12 Pullman cars, between Grand Central terminal and New Haven in 90 min. at schedule speed of 44 mi. per hr. See also Ry. & Locomotive Eng., vol. 36, no. 4, Apr. 1923, pp. 121-123, 2 figs.

ELECTRIC POWER

Steam vs. The Cost of Industrial Power, L. A. Burnett. Eng. Jl. (Eng. Inst. Can.), vol. 6, nos. 3 and 4, Mar. and Apr. 1923, pp. 140-141 and 180-183, 3 figs. Comparison of cost of steam and electric power in industry, with discussion of operating features of latter.

ELECTRIC WELDING, ARC

Experiments. The Electric Arc Between Carbon and Metal (Der Lichtbogen zwischen Kohle und Metall), Autogene Metallbearbeitung, vol. 16, no. 4, Feb. 15, 1923, pp. 47-50, 5 figs. Discusses electric arc welding and gives results of experiments by Electro-Thermit Company.

Penetration and Overlap. Penetration and Overlap in Arc Welding, O. H. Escholz. Can. Machy., vol. 29, no. 6, Feb. 8, 1923, pp. 24-25 and 33, 15 figs. Line of demarcation indicates zone of fusion; liquefying of plate metal; effect of low-melting point electrode; degree of fusion dependent on arc current.

ELECTRIC WELDING, RESISTANCE

Butt-Welding Machines. Heating Without Fire—Electric Forges and Rivet Heaters (Feuerlose Erhitzung. Elektrische Essen und Nietwarmer), Albert Neuburger. Elektrische Betrieb, vol. 21, no. 4, Feb. 24, 1923, pp. 39-40, 4 figs. Describes new electric butt-welding machine and its operation, also rivet heaters.

Development. Progress in Electric Welding (Fortschritte auf dem Gebiete des elektrischen Schweissens), Wundram. Elektrische Kraftbetriebe u. Bahnen, vol. 20, no. 46, Aug. 24, 1922, pp. 169-172. Discusses resistance and arc welding; current supply.

ELEVATORS

Electric. Operation of Modern Electric Elevators (Sistemas y aparatos modernos de maniobra para ascensores eléctricos), C. A. Gullino. Energia Electrica, vol. 25, no. 4, Feb. 25, 1923, pp. 47-52. Discusses mechanical, electromechanical and electric operation, and apparatus required.

Mechanical Interlocks. Mechanical Interlocks—Their Effectiveness, Clayton W. Old. Safety Eng., vol. 45, no. 3, Mar. 1923, pp. 72-79. Classes of accidents; "safety gates;" power-closed doors; inner car gates; car-gate contacts.

EMPLOYMENT MANAGEMENT

Efficiency Marking. Efficiency Marking of Employees, George H. Rock. Indus. Management (N. Y.), vol. 65, no. 4, Apr. 1923, pp. 243-246. Putting, hiring, discharging and promotion on just basis.

Human Nature in. Human Nature in Industry, Ernest C. Gould. Indus. Management (N. Y.), vol. 65, no. 4, Apr. 1923, pp. 221-224. Sidelights on human nature accumulated by experience of employment manager.

Uniform Vacation. What about Handling Vacations this Year? C. A. Upson. Factory, vol. 30, no. 4, Apr. 1923, pp. 405-408 and 436, 2 figs. New plan tried by Upson Co., according to which everyone took vacation at same time.

ENAMELING

Automobiles. New Conveyor and Oven Installation Cuts Enameling Costs. Automotive Industries, vol. 48, no. 14, Apr. 5, 1923, pp. 756-758, 3 figs. Only six men needed to enamel 5000 passenger-car parts in normal working day; maximum utilization of heat generated reduces operating expense; process required 2 hr. 42 min. for two coats and two bakes. Equipment installed in Durant factory, Elizabeth, N. J.

ENGINEERS

Licensing. Licensing Laws for Engineers. Chem. & Met. Eng., vol. 28, no. 13, Mar. 28, 1923, pp. 588-589. Survey of licensing conditions as affecting professional engineers in various states.

EVAPORATION

Vapor-Compression. Vapor Compression or Heat-Pump Operation (Ueber Kompressionsverdampfung), W. Gensecke. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 11, Mar. 17, 1923, pp. 249-255, 14 figs. Thermal economy of concentration methods, and in the sugar industry; applications of vapor compression; operating results in an evaporation plant for skimmed milk; economy of compression.

EXHAUST STEAM

Utilization. Plants for Utilizing Waste Steam in Railway Works (Anlagen zur Verwertung von Abdampf in Reichsbahnwerken), Bartels. Warme, vol. 46, no. 1, Jan. 5, 1923, pp. 6-9, 5 figs. Describes German railway workshop at Cassel and its arrangements for utilizing waste steam.

The Economical Use of Exhaust Steam, Allen F. Brewer. Combustion, vol. 8, no. 3, Mar. 1923, pp. 162-163. Unit cost of steam; general notes on utilization of exhaust steam.

EXTRUSION OF METALS

Brass Rods. The Extrusion Defect in Brass Rods Extruded from a Multiple Die, R. Genders. Am. Inst. of Metals, advance paper, no. 9, for meeting Mar. 7-8, 1923, 3 pp., 4 figs. Results of examination of rods of 60-40 brass, 0.625 in. in diam., extruded from billet 5.25 in. in diam. through die having three apertures equidistant from center and about 2 in. apart.

F

FACTORIES

Design. Industrial Plant Design, J. L. McConnell. West. Soc. Engrs.—Jl. (Tech. Papers), vol. 28, no. 1, Jan. 1923, pp. 1-14 and (discussion) 15-17, 11 figs. Discusses points that make for economy of space and manufacture. Describes plant of Hubbard & Co. for manufacture of pole-line hardware which was designed in author's office.

FANS, CENTRIFUGAL

Constructive Mechanism, Application of. Constructive Mechanism and the Centrifugal Fan, George D. Beals. Heat. & Vent. Mag., vol. 20, no. 1, Jan. 1923, pp. 42-47, 6 figs. Principles of constructive mechanism as applied to centrifugal fan. Uses as example multi-bladed type fan having wheel 48 in. in diameter, handling 44,750 cu. ft. air per min. against static resistance of 2½ in. water gage and running at speed of 415 r.p.m., peripheral velocity 5215 ft. per min., with 50-hp. motor for driving.

FEEDWATER HEATERS

Multiple-Stage. Feed Heating Reduces Steel Power Cost, Linn Helander. Iron Age, vol. 111, no. 15, Apr. 12, 1923, pp. 1023-1025, 2 figs. Points out that significant reduction in fuel consumption can be made in steel-plant power stations by use of multiple-stage heating of boiler feedwater and bleeding of main turbine.

FLOW OF GASES

Pulsations, Effect of. Effect of Pulsations on Flow of Gases, Horace Judd and Donal B. Pheley. Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 224-228 and (discussion) 228-229 and 270, 6 figs. Experimental work for purpose of studying nature of pulsation and of finding practical means of reducing or eliminating pulsation or of compensating for its effects on devices used for measuring fluid flow. (Abridged.)

FLOW OF WATER

Orifices. Orifice Flow, Dempster Smith and William J. Walker. Instn. Mech. Engrs.—Proc., no. 1, Jan. 1923, pp. 23-36, 6 figs. Investigations for deduction of rational formula for orifice flow. All experiments were carried out on water.

FLUE-GAS ANALYSIS

CO_2 Recorder. The Ranarex CO_2 Recorder. Engineering, vol. 115, no. 2988, Apr. 6, 1923, p. 443, 4 figs. Instrument of Continental design which is entirely mechanical in its action; essential parts are two fans kept in rapid rotation by means of small electric motor at top of instrument.

Sulphurous-Acid Determination. Determination of Sulphurous Acid in Flue Gases (Die Bestimmung von schwefliger Säure in den Schornsteingasen), K. Balthasar. Chemiker-Zeitung, vol. 47, no. 32, Mar. 15, 1923, pp. 225-226, 3 figs. Method and apparatus used.

Weighing Apparatus. Apparatus That Weighs Furnace Gases, Thus Determining Their Dioxide Percentage. Coal Age, vol. 23, no. 12, Mar. 22, 1923, pp. 482-484, 2 figs. Apparatus devised by Z. Olsson for weighing waste gases of furnace.

FLYWHEELS

Calculation. Calculation of Flywheels by the Theory of Elasticity (Note sur le calcul des volants pleins par la théorie de l'élasticité), Georges Prudon. Génie Civil, vol. 82, no. 12, Mar. 24, 1923, pp. 280-282, 3 figs. Determination of molecular action in play in flywheels of great angular velocity and very large rim; calculations.

FOREMEN

Problems of. The Problem of the Foremen, Eric N. Simons. Indus. Management (Lond.), vol. 9, nos. 5 and 6, Mar. 8 and 22, 1923, pp. 134-136 and 163-165. Practical advice based upon author's experience in large industrial establishment producing wide variety of manufactures; problems confronting organizer of modern works in regard to selection of efficient foremen, and work for which he is responsible.

Training. Foremanship Training in the Medium-Sized Plant, Harold Moore. Indus. Management

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 136

* Erie City Iron Works
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Springfield Boiler Co
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water, Metering
* H. S. B. W.-Cochrane Corp'n

Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
Clarage Fan Co.

Heating Specialties
* Fulton Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.

Hoisting Outfits
Novo Engine Co

Hoists, Air
* Ingersoll-Rand Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Hoists, Belt
Clyde Iron Works Sales Co
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n

Hoists, Electric
* Allis-Chalmers Mfg. Co
* American Engineering Co
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.

Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.
Novo Engine Co.

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Locomotive & Coach
Whiting Corp'n

Hoists, Mine
Lidgerwood Mfg Co.
Novo Engine Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Hoists, Steam
(See Engines, Hoisting)

Holders, Nipple
Curtis & Curtis Co.

Hose, Acid
United States Rubber Co.

Hose, Air and Gas
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Fire
United States Rubber Co.

Hose, Gas
United States Rubber Co.

Hose, Gasoline
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Metal, Flexible
* Johns-Manville (Inc.)

Hose, Oil
United States Rubber Co.

Hose, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Steam
United States Rubber Co.

Hose, Suction
United States Rubber Co.

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n

Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Worthington Pump & Machinery Corp'n

Hydraulic Machinery
* Allis Chalmers Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Press Control Systems (Oil Pressure)
American Fluid Motors Co

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
Taylor Instrument Cos.

Hygrometers
Taylor Instrument Cos.

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Gifford-Wood Co.

Idlers, Belt
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Indicators, CO
* Uehling Instrument Co.

Indicators, CO_2
Bacharach Industrial Instrument Co.
* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.

Indicators, Engine
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Indicators, SO_2
* Uehling Instrument Co.

Indicators, Speed
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Injectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Inserts, Steel
Midwest Steel & Supply Co.

Instruments, Electrical Measuring
* General Electric Co.
Taylor Instrument Cos.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Instruments, Recording
* Ashton Valve Co.
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* General Electric Co.
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.
* Westinghouse Electric & Mfg. Co.

Instruments, Scientific
Taylor Instrument Cos.

Instruments, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Insulating Materials (Electric)
* General Electric Co.
* Johns-Manville (Inc.)

Insulating Materials (Heat and Cold)
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
United States Rubber Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.
* Lunkenheimer Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.
* Titusville Iron Works Co.

Keys, Machine
Smith & Serrell
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Ladles
Northern Engineering Works
Whiting Corp'n

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
* Johns-Manville (Inc.)
* Westinghouse Electric & Mfg. Co.

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Levers, Flexible (Wire)
* Gwilliam Co.

Linings, Brake
* Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Furnace & Burner Corp'n
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
McLeod & Henry Co.
* Quigley Furnace Specialties Co.

Linings, Stack
* Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n

Loaders, Portable
* Gifford-Wood Co.
Link-Belt Co.

Lockers, Metal
Manufacturing Equip. & Engrg. Co.

Locomotives, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Locomotives, Storage Battery
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Machine Tool Feed Control Systems (Oil Pressure)
American Fluid Motors Co.

Machine Work
Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Lammert & Mann Co.
Link-Belt Co.
Purvis Machine Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.
* Simplex Valve & Meter Co.

Mechanical Draft Apparatus
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Mechanical Stokers
(See Stokers)

Metal Treating
* American Metal Treatment Co.
Hyro Mfg. Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Precision Instrument Co. (Inc.)
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

(N. Y.), vol. 65, no. 4, Apr. 1923, pp. 214-215. Method successfully employed at Corning Glass Works.

FORGING

Cold, Steel for. The Selection of Steel for Cold Forging, John B. Frederick. Forging & Heat Treating, vol. 9, no. 3, Mar. 1923, pp. 161-162. 1 fig. Materials best suited for cold forging operations, cause of fibrous or "woody" fractures of cold-headed cap screws; annealing as remedy.

FOUNDATIONS

Power-Plant Equipment. Foundations for Power Plant Equipment, Charles L. Hubbard. Nat. Engr., vol. 27, no. 3, Mar. 1923, pp. 117-121, 7 figs. Bearing surface to sustain loads; materials used for foundation and estimating quantity; points on construction useful to operators.

FOUNDRIES

Automobile Castings. Foundry Layout and Material Handling, Henry M. Lane. Iron Age, vol. 111, no. 15, Apr. 12, 1923, pp. 1037-1040. 7 figs. Plant of Wilson Foundry & Machine Co., Pontiac, Mich.; quantity production of automobile castings expedited by mechanical means; development from small to large foundry.

Chemical Symbols. Chemical Symbols as an Aid to Foundry Progress, F. C. Edwards. Foundry Trade J., vol. 27, no. 343, Mar. 15, 1923, pp. 220-221. Symbols employed; grouping of symbols; equations; practical application.

Electric Heating in. Electric Heating in the Foundry, T. A. Reid. West. Machy. World, vol. 14, no. 2, Feb. 1923, pp. 57-58, 4 figs. Deals with electric core ovens and electrically heated pattern plates. Points out saving of time and fuel and elimination of waste obtained by use of electric heating.

French. Visiting French Demonstration Foundry, Can. Foundryman, vol. 14, no. 3, Mar. 1923, pp. 13-15, 7 figs. Details of foundry at Choisy le Roi; pressure machines, hydraulically driven, rather than jolting machines pneumatically driven, receive favor, special attention given to preparation of sand.

Methods and Equipment. Operating Wilson Foundry, D. R. Wilson. Foundry, vol. 51, nos. 6, 7 and 8, Mar. 15, Apr. 1 and 15, 1923, pp. 218-225 and 323-327, 15 figs. Plant and operating methods of Wilson Foundry & Machine Co., Pontiac, Mich. Sand-handling equipment; core handling, molding and coremaking methods. Producing cylinder cores for Knight motors. Metallurgical control of sand and other materials.

FUELS

Bagasse. Utilization of Bagasse Fuel, Zuce Kogan. La. Planter & Sugar Manufacturer, vol. 70, no. 12, Mar. 24, 1923, pp. 230-231. Question of drying; heat absorbed for drying; importance of heating within furnace; kind of heat used in furnace drying; drying fuel in grates.

Heating Value. Calculation of Heating Value From Constitution of the Compounds (Studien uber die Berechnung des Heizwertes aus der Konstitution der Verbindung), Otto H. Binder. Warme- u. Kalte-Technik, vol. 25, no. 3, Feb. 1, 1923, pp. 21-22. Heating value of fuels; Dulong formula and its application to finding theoretical value of fuels.

Heating Values and Composition of Fuels (Heizwerte und Zusammensetzung von Brennstoffen). Zeit. des Bayer. Revisions-Vereins, vol. 27, nos. 3 and 4, Feb. 15 and 28, 1923, pp. 20 and 27-29. Examinations during 1922 in chemical laboratory of Bayerischen Revisions-Verein of anthracite, brown coal and lignite; briquets; coke; peat; wood, sawdust, etc.; and oil fuels.

Industrial Heating. The Selection of Fuel for Industrial Heating Operations, Hos. A. Doyle. Forging & Heat Treating, vol. 9, no. 3, Mar. 1923, pp. 156-160, 3 figs. Flame temperature, rate of combustion, composition of gas and of flue gases are essential; characteristics of fuel; progress in gas manufacture and fuel utilization.

Recovery from Ashes. Fuel Recovery from Furnace Residue. Die Ruckgewinnung von Brennstoffen aus Feuerungsruckstanden), Albert Neuburger. Elektrische Kraftbetriebe u. Bahnen, vol. 20, no. 22, Nov. 24, 1922, pp. 250-253, 6 figs. Describes ash separator systems made by Krupp and other manufacturers, both magnetic and specific gravity types.

Recovery of Unburnt Fuel. Times Trade & Eng. Supp., vol. 11, no. 241, Feb. 17, p. 539, 2 figs. Methods of separation from ashes; flotation methods; special washing media; magnetic spearation.

The Recovery of Unburnt Fuel from Ashes, G. Reder. Eng. Progress, vol. 4, no. 3, Mar. 1923, pp. 53-57, 15 figs. Summary of processes adopted by various firms; treatment of ashes and design of plants used for this purpose; application of various processes.

Utilization. Modern Utilization of Fuels (Neuzeitliche Verwertung der Brennstoffe), G. Fester. Zeit. fur angewandte Chemie, vol. 36, no. 16, Feb. 24, 1923, pp. 117-119, 3 figs. Discusses solid and liquid fuels from standpoint of chemical raw materials and of energy carriers; carbonization of coal and lignite; tar production.

Summary of Studies Made in Great Britain on the Utilization of Fuels (Exposé des etudes faites en Grande-Bretagne sur l'utilisation des combustibles), E. Audibert. Revue de l'Industrie Minérale, no. 53, Mar. 1, 1923, pp. 113-149, 8 figs. Report of special investigation covering carbonization of coal, production of water gas, transformation of coal into liquid fuel, the MacLaurin furnace, handling of coal dust, chemical composition of coal, etc.

[See also COAL; LIGNITE; OIL FUEL; PEAT; PULVERIZED COAL.]

FURNACES, HEATING

Design. Heating Furnaces (Quelques Remarques sur les Fours à rechauffer), Emm. Langlois. Vie Technique et Industrielle, vol. 5, no. 42, Mar. 1923, pp. 384-388, 8 figs. Construction of metal-heating furnaces of two types, viz., hearth with bed, and continuous.

FURNACES, INDUSTRIAL

Gas-Firing. Industrial Furnaces (Gewerbliche und industrielle Feuerungen), H. Ludwig. Gas- u. Wasserfach, vol. 66, nos. 1, 2, 3 and 4, Jan. 6, 13, 20 and 27, 1923, pp. 1-4, 20-23, 36-39 and 55-57, 13 figs. Laws of combustion and heat transmission; it is shown that firing with gas is often expedient and economical, and propaganda for its use should be conducted by gas industry. Paper read before German Soc. of Gas & Hydraulic Engrs.

Small, Recuperators for. Heat Salvage in Small Furnaces, W. C. Buell, Jr. Chem. & Met. Eng., vol. 28, no. 14, Apr. 9, 1923, pp. 638-641, 7 figs. 30 per cent fuel saved on even small tool-room furnace by simple recuperator; heat-resisting pipe offers ideal medium with which to build heat interchanger.

G

GAGING

Methods. Modern Gauging Methods, Axel Wickman. Eng. Production, vol. 6, no. 127, Apr. 1923, pp. 242-247, 21 figs. Fundamental principles governing limit gaging; describes Wickman measuring machine specially designed to permit use of slip gages as standards, and to enable transference of size to take place within guaranteed error of 0.00001 in.; use of tolerance to best advantage.

GAS ENGINES

Producer Gas. Producer Gas Engines—Application to Navigation in the French Colonies (Les moteurs à gaz pauvre—Applications a la navigation coloniale). Bul. Technique du Bureau Veritas, vol. 5, no. 1, Jan. 1923, pp. 13-16, 3 figs. Report by Beelaerts to Brussels Colonial Society, on propulsion of river boats by producer gas, mixed gas or poor gas; production of gas and engines used.

Types. Gas Engines and Gas Producer Plants, Hugh Campbell. Inst. Mar. Engrs.—Trans., Mar. 1923, pp. 471-483 and (discussion) 483-496, 10 figs. Describes different types of engines and gas plants.

Vertical. A Self-Contained Gas Power Unit. Power Engr., vol. 18, no. 203, Feb. 1923, pp. 52-53, 3 figs. Vertical gas engine suitable for running on town or producer gas, and with latter and generator forms self-contained power plant.

GAS PRODUCERS

Economical Design. A New Gas Producer. Engineer, vol. 135, no. 3510, Apr. 6, 1923, p. 364, 2 figs. New type of plant introduced by R. G. Syndicate consists of mechanically fed coal hopper, retort and producer; designed to secure higher thermal efficiency, obtain by-products more efficiently, and extend range of fuels available.

Wood-Burning. Using Wood in Gas Producers (Utilisation du bois dans les gazogènes), A. Fichet. Genie Civil, vol. 82, no. 12, Mar. 24, 1923, pp. 277-280. Describes apparatus of Société Vierzon and its operation with wood dried at 150 deg.

GASES

Compression, Hazards in. Safety Engineering in the Compression of Gases, A. D. Risteen. Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 242-245. Outline of hazards associated with compression of gases in common use in industry, such as air, oxygen, nitrogen, argon, carbon dioxide, hydrogen, acetylene, ammonia, and chlorine.

GEAR CUTTING

Helical Gears. Quality Production of Double Helical Gears. Can. Machy., vol. 29, no. 6, Feb. 8, 1923, pp. 20-21 and 29, 8 figs. Essential features of cutting gears by hobbing process; cutting double-helical gears; calculations for tooth size and aligning teeth.

Herringbone Gears. Cutting Double Helical Herringbone Gears, Franklin D. Jones. Machy. (N. Y.), vol. 29, nos. 7 and 8, Mar. and Apr. 1923, pp. 548-553 and 613-616, 20 figs. Application of hobbing machines of single- and double-hob types. Duplex type of planer used for herringbone gears of large pitch; application of gear shapers and end-milling process.

Methods and Equipment. Quantity Production of Gears, C. A. Handschin. West. Machy. World, vol. 14, no. 3, Mar. 1923, pp. 83-84 and 89, 6 figs. Equipment and methods of gear-cutting department of C. L. Best Tractor Co.

GEARS

Ball-Friction. Transmission of Power through Ball Friction Gearing, Carl G. Nordstrom. Am. Mach., vol. 58, no. 16, Apr. 19, 1923, pp. 592-593, 4 figs. Describes construction developed in Sweden by Gustav Rennerfelt.

Involute. Generating Involute Gear Teeth and Interference In Involute Gears. West. Machy. World, vol. 14, no. 3, Mar. 1923, pp. 85-86, 5 figs. Practice at Fellows Gear Shaper Co.

Normal Pitch as a Basic Factor in Computing Involute Gears, Ellsworth Sheldon. Am. Mach., vol. 58, no. 8, Feb. 22, 1923, pp. 285-287. Factor based upon parallelism of involutes; does away with many complications and takes account of profile errors as well as errors of spacing; normal pitch easy to measure.

Quality Control. Quality Control in Gear Manufacture, S. O. Biornberg. Machy. (N. Y.), vol. 29, no. 8, Apr. 1923, pp. 623-626, 7 figs. Equipment employed for inspecting hob, hobbing machine, and finished gear.

GRINDING

Regrinding Practice. Modern Regrinding Shop Practice, L. A. Hastings. Abrasive Industry, vol. 4, no. 3, Mar. 1923, pp. 70-73, 6 figs. Locating Cylinders for regrinding; selection of correct wheel; fitting oversize pistons and piston rings; importance of accurate work.

Modern Tools Regrind Auto Parts, Herbert T. Simonds. Abrasive Industry, vol. 4, no. 3, Mar. 1923, pp. 65-68, 6 figs. Equipment and methods for regrinding cylinders, crankshafts, etc.

Railway Shops. European Grinding Practice Being Extended. Ry. Mech. Engr., vol. 97, no. 4, Apr. 1923, pp. 236-239, 9 figs. Describes grinding machines and methods of proven value in British and Continental repair shops.

GRINDING MACHINES

Surface. Care and Operation of Production Surface Grinding Machines, J. M. Henry. Abrasive Industry, vol. 3, no. 11, Nov. 1922 and vol. 4, no. 2, Feb. 1923, pp. 329-331 and 42-45, 13 figs. Determining wheel wear; dressing and removal wheel; grinding chuck; etc.

Tools. The S. H. D. Automatic Universal Tool-Grinding Machine. Engineering, vol. 115, no. 2987, Mar. 30, 1923, pp. 396-397, 9 figs. Details of machine manufactured by Societé des Anciens Etablissements Hotchkiss et Cie., Paris.

H

HARDNESS

Scleroscope Test. The Scleroscope Hardness Test. A New Form of Magnifier Hammer, R. Genders. Inst. of Metals, advance paper, no. 10, for meeting Mar. 7-8, 1923, 17 pp., 9 figs. It is shown that lack of agreement exists between magnifier hammer readings in different scleroscopes, due to slight variation in contour of striking portion of hammer nose; remedies are suggested. Bibliography.

HEALTH

Physiological Reactions to High Temperatures. Some Physiological Reactions to High Temperatures and Humidities, W. J. McConnell and F. C. Houghten. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 2, Mar. 1923, pp. 131-163, 43 figs. Statement of what has been attained in present study and general reference to future work contemplated; description of facilities available and methods used; discussion of physiological findings of author's experiments.

HEAT TRANSMISSION

Buildings. Heat Transmission through Building Structures, E. F. Mueller. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 2, Mar. 1923, pp. 69-73. Method and apparatus used in Bur. of Standards tests.

Calculation. Transfer of Heat, Terrell Croft. Combustion, vol. 8, no. 3, Mar. 1923, pp. 187-190, 4 figs. Thermal resistance and thermal conductance; transfer of heat by convection, and its many ways of utilization, i.e., in hot-water, steam, and hot-air heating systems, ventilating systems, steam boilers, etc.; calculations.

HEATING, ELECTRIC

Buildings. Electricity for Heating Buildings, C. Cordon Gale. Eng. Jl. (Eng. Inst. Can.), vol. 6, no. 4, Apr. 1923, pp. 183-185, 2 figs. Explanation of why general use of electrical energy for heating is impractical.

HEATING, HOT-AIR

Ducts. Methods of Supporting and Erecting Ducts, T. W. Reynolds. Heating & Vent. Mag., vol. 20, no. 3, Mar. 1923, pp. 46-47, 1 fig. Kind of material used for supports; how ducts are braced.

Gun Shop. Heating the New Navy Gun Shop, M. S. Cooley. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 2, Mar. 1923, pp. 100-106, 4 figs. Hot-blast system provided with fans and heaters in roof spaces and distributing ducts alongside of columns.

Waste-Heat Utilization. Industrial Hygiene Plants and Utilization of Waste Heat (Gewerbehygienische Anlagen und Abwärmeausnutzung), Otto Brandt. Wärme, vol. 46, nos. 3 and 4, Jan. 19 and 26, 1923, pp. 25-27 and 39-41, 17 figs. Air conditions in winter; production of hot air by use of flue gas and waste steam; briquetting of scrap for fuel; unit and central heating; humidifiers; etc.

HEATING, STEAM

Radiator Traps. Tests of Radiator Traps, W. F. Stutz. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 2, Mar. 1923, pp. 79-86, 6 figs. Performance of eight types investigated and results compared.

Vacuum. Vacuum-Vapor Heating Systems, E. R. Pierce. Domestic Eng. (Chicago), vol. 101, nos. 11 and 13, Dec. 16 and 30, 1922 and vol. 102, nos. 1 and 4, Jan. 6 and 27, 1923, pp. 475-477, 573-576, 32-34 and 171-174, 25 figs. General history of growth of various types of vacuum, vacuum-vapor and straight vapor systems.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 136

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Shepard Elect. Crane & Hoist Co.
* Westinghouse Electric & Mfg. Co.

Motors, Synchronous
* Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Lunkenheimer Co.

Oil and Grease Guns
* Royersford Fdry. & Mach. Co.

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Improved Equipment Co.
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Well Machinery
* Brownell Co.
* Ingersoll-Rand Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Oiling Devices
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oiling Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oils, Fuel
Texas Co.

Oils, Lubricating
Texas Co.
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.
Link-Belt Co.

Ovens, Core
Whiting Corporation

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
Linde Air Products Co.

Packing, Ammonia
France Packing Co.
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Packing, Asbestos
* Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Packing Rubber
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
United States Rubber Co.

Packing Sheet
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Paint, Metal
* General Electric Co.
* Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paper, Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
DuPont Engineering Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
Dixon, Joseph Crucible Co.
Keuffel & Esser Co.

Penstocks
Smith, S. Morgan Co.

Petroleum Products
Texas Co.

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* U. S. Cast Iron Pipe & Fdry. Co.

Pipe, Riveted
* American Spiral Pipe Wks.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe, Welded
* American Spiral Pipe Wks.
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Plate Metal Work
(See Steel Plate Construction)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Morse Chain Co.
* Poole Engrg. & Mch. Co.
* Royersford Fdry. & Mach. Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
Philadelphia Drying Machy. Co.

Presses, Foot
* Royersford Fdry. & Mach. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Machy. Co.

Presses, Punching and Trimming
Long & Allstatter Co.
* Royersford Fdry. & Mach. Co.

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machy. Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Machine Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. & Sons Co.

Pulleys, Iron
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
Kenworthy, Chas. F. (Inc.)

Pulverizers
Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc. Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Outfits
Novo Engine Co.

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Titusville Iron Works Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
Midwest Engine Corp'n
* Morris Machine Works
Novo Engine Co.
Taber Pump Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
Novo Engine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Deep Well, Axial
Midwest Engine Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

HOISTING ENGINES

Reversible. A Reversible Hoisting Engine. Practical Engr., vol. 67, no. 1878, Feb. 22, 1923, p. 101, 1 fig. Describes design developed by Rushworth Bros. Ltd., London, to meet need of moderately high-speed engine for general hoisting and crane work.

HOISTS

Electric. Electric Lifting Apparatus (Essai de classification des appareils de levage à courant électrique), H. Meuris. Revue Générale de l'Electricité, vol. 13, no. 5, Feb. 3, 1923, pp. 175–181, 11 figs. Different combinations of movement that can be effected; power required; comparison of electric motor and hydraulic motor.

HYDRAULIC TURBINES

Developments. Modern Hydraulic Turbines. Indian & Eastern Engr., vol. 51, nos. 5 and 6, Nov. and Dec. 1922 and vol. 52, no. 1, Jan. 1923, pp. 255–257, 311–314 and 29–31, 13 figs. Recent development in design of turbines as applied principally to hydro-electric work. Nov.: Low-pressure turbines; draft tube known as hydraucone. Dec.: Francis turbines for moderate heads. Jan.: High-head Francis turbines.

Recent Progress in the Utilization of Hydraulic Power (Recents progrès dans l'utilisation de la force hydraulique), E. Bergstrom. Annales de l'Energie, vol. 2, nos. 4, 5 and 6, July-Aug., Sept.-Oct. and Nov.-Dec. 1922, pp. 136–141, 178–183 and 217–220, 24 figs. Speed regulators for Francis turbines, characteristics and control of Pelton wheels, and examples of modern installations; low- and high-pressure conduits, of wood, concrete, and steel.

Performance, Analysis of. The Hydraulic Turbine: Analysis of Performance, F. Johnstone Taylor. Elec. Times, vol. 58, no. 1639, Mar. 15, 1923, pp. 263–266, 9 figs. Characteristics; relations of power, speed and discharge; discrepancies in head measurement; horsepower and performance; tests.

Regulators. Exploiting Small Water Power Resources (Vorschläge über die Ausnutzung kleiner Wasserkräfte), C. Reindl. Elektrische Kraftbetriebe u. Bahnen, vol. 20, no. 21, Nov. 10, 1922, pp. 237–240, 5 figs. Describes Thoma automatic control device for d.c. turbine installations.

Types. Water Turbines and Their Principle, W. B. Roberts. Power House, vol. 16, no. 3, Feb. 5, 1923, pp. 25–29, 11 figs. Forces involved in converting head pressure into useful work, and means of effecting this through various types of turbines; practical installations.

HYDROELECTRIC DEVELOPMENTS

Bavaria. The Harnessing of the Isar River (Bavaria) (Der Ausbau der Mittleren Isar), E. Mattern. Zeit. des Vereines deutscher Ingenieure, vol. 67, nos. 9 and 10, Mar. 3 and 10, 1923, pp. 211–214 and 235–238, 20 figs. Construction of four power plants with total of 82,000 hp. in a 53.6-km. side canal of Isar River just below Munich, which will also be made navigable. Constructional details.

California. More than a Million Horsepower, George C. Tenney. Jl. Elec. & West. Industry, vol. 50, no. 7, Apr. 1, 1923, pp. 245–253, 10 figs. Development of So. Cal. Edison Co.; data on Big Creek-San Joaquin River hydroelectric project where approximately $300,000,000 is being spent to produce and market 1,400,000 hp.

Preliminary Developments on a Hydro-Electric Project, H. K. Fox. Eng. News-Rec., vol. 90, no. 16, Apr. 19, 1923, pp. 696–698, 5 figs. 300,000-hp. system on Kings River in California begun with building of camps, roads, bridges, and gaging stations; winter quarters maintained by hydrographers.

Manchester, N. H. The Amoskeag Hydro-Electric Development, Albert S. Baker. Textile World, vol. 63, no. 9, Mar. 3, 1923, pp. 73–74 and 149, 4 figs. Concrete dam and power house harness waters of Merrimack River at Manchester, N. H., for world's largest cotton mill; water power increased 40 to 50 per cent with completion of development.

HYDROELECTRIC PLANTS

Austria. The Ybbs Works at Opponitz, First Hydro-electric Plant for the Supply of Vienna (Der Bau des Ybbswerkes bei Opponitz als erstes der für die Energieversorgung Wiens in Aussicht genommenen Wasserkraftwerke), Franz Kuhn. Elektrotechnik u. Maschinenbau, vol. 41, no. 10, Mar. 11, 1923, pp. 149–158, 10 figs. Work in course of construction; dams and tunnels; pressure conduits; machinery and electric equipment; transmission poles and lines; switching arrangements; 100,000 volts.

Automatic Operation. Station Operates Automatically. Power Plant Eng., vol. 27, no. 8, Apr. 15, 1923, pp. 403–407, 8 figs. New England Power Co. 5000-kva. hydroelectric station at Wilmington, Vermont, designed for complete automatic operation; station started up by time clock or by level of storage pond.

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ICE PLANTS

Freezing Tanks. Heat Transfer in the Freezing Tank, H. I. Lewis. Ice & Refrigeration, vol. 64, no. 3, Mar. 1923, pp. 197–202, 10 figs. Heat and work; heat transference; brine agitation and flow; relation of heat transmission and brine circulation; relation of compressor and brine-circulation power.

Oil-Engine-Driven. Ice-Making Economy with Oil Engines. Oil Engine Power, vol. 1, no. 3, Mar. 1923, pp. 117–122, 6 figs. Describes oil-engine-driven ice plant in Jersey City, N. J., of Feigenspan Corp.; normal daily capacity of 200 tons of ice; performance of the two 300-b.hp. and two 150-b.hp. twin-cylinder horizontal-type De La Vergne engines and ammonia compressors.

Steam-Driven. A Steam Driven Ice Plant, A. J. Volk. Refrig. World, vol. 58, no. 3, Mar. 1923, pp. 18–20, 1 fig. Cost of making ice in plant of Hudson Consumers Ice Co., Hoboken, N. J.; satisfactory results obtained.

INDUSTRIAL MANAGEMENT

Assembling Methods. Methods Used in Assembling Sweepers, Fred. H. Colvin. Am. Mach., vol. 58, no. 8, Feb. 22, 1923, pp. 281–283, 7 figs. Layout of assembly departments with modern conveying apparatus; running motors on assembly trucks; securing cooperation by group-bonus method. Practice of Hoover Suction Sweeper Co.

Engineering Department. The Successful Operation of an Engineering Department, W. E. Irish. Indus. Management (N. Y.), vol. 65, no. 4, Apr. 1923, pp. 225–231. Meeting emergencies.

Engineering Specifications. Coordinating the Bill of Materials With Shop Requirements, G. G. Thompson. Am. Mach., vol. 58, no. 12, Mar. 22, 1923, pp. 451–454, 2 figs. Intelligent sub-assembly grouping and numbering simplifies shop methods; card file more flexible than materials sheet; chances of error and waste reduced.

Organizing and Directing. The Three Divisions of Management, Joseph Mayer. Management Eng., vol. 4, no. 4, Apr. 1923, pp. 255–257, 1 fig. Organizing, preparing and directing.

Principles. The Principles of Organisation and Management, Wallace Attwood. Indus. Management (Lond.), vol. 9, nos. 4, 5, 6 and 7, Feb. 22, Mar. 8, 22 and Apr. 5, 1923, pp. 109–111, 137–139, 174–176 and 202–204, 2 figs. Indication of main points that must be borne in mind when building up efficient organization. Paper read before Instn. Production Engrs.

Production Methods. Works Production, G. H. Nelson. Instn. Elec. Engrs. Jl., vol. 61, no. 316, Mar. 1923, pp. 338–352 and (discussion) 352–362, 5 figs. Describes system of organization successfully employed in works for manufacture of electrical machinery.

What We Did to Double Production, Owen Earhart. Management Eng., vol. 4, no. 4, Apr. 1923, pp. 217–222, 11 figs. System of production control adopted in tin-can factory.

[See also COST ACCOUNTING; MOTION STUDY.]

INDUSTRIAL TRUCKS

Types. What Type of Industrial Truck Do I Need? W. T. Spivey. Factory, vol. 30, no. 4, Apr. 1923, pp. 416–419, 462, 464 and 466, 12 figs. Advantages of low platform; outdoor hauls.

INSULATORS, HEAT

Steam-Pipe Covering. Heat Insulation Applied to Steam Pipes (Les calorifuges appliqués aux tuyaux de vapeur), H. Carra. Chaleur & Industrie, vol. 4, no. 34, Feb. 1923, pp. 129–136, 14 figs. Losses due to absence of insulation; detailed explanation of proper choice of insulation for given case.

INTERNAL-COMBUSTION ENGINES

Detonation. Laws Governing Gaseous Detonation, Thomas Midgley, Jr. and Robert Janeway. Soc. Automotive Engrs.—Jl., vol. 12, no. 4, Apr. 1923, pp. 367–373, 12 figs. Explanation of gaseous detonation based upon what are considered incontrovertible laws. Mathematical determination of critical pressure of detonation.

Fuel Problems. Raindrops and Engineering, G. B. Upton. Sibley Jl. Eng., vol. 37, nos. 1, 2 and 3, Jan., Feb. and Mar., 1923, pp. 2–7 and 9, 32–36, and 60–63 and 65, 1 fig. Points out that laws which control size of rain drop in air apply equally well to moisture drops in steam, to gasoline and oil drops in air in internal-combustion engines, etc. Feb.: Carburetion of internal-combustion engines. Mar.: Direct or "solid" injection of fuel for internal-combustion engines.

Heavy-Fuel Utilization. The Present Status and Probable Development of Internal-Combustion Engines to Consume Heavy Fuels. Oil Engine Power, vol. 1, nos. 2 and 3, Feb. and Mar. 1923, pp. 89–91 and 95–99, and 134–136 and 141, 2 figs. Paper on "How the Problem Looks to Me," by Henry L. Doherty, read before third annual meeting of Am. Petroleum Inst., and remarks by others, which include experience with fuels, effect of sulphur, overcoming peculiarities of heavy fuels, reliability of Diesel engines, capacities and efficiencies, heavy-oil engine for automobile use, etc.

High Compression. Internal-Combustion Engine Characteristics under High Compression. Soc. Automotive Engrs.—Jl., vol. 12, no. 4, Apr. 1923, pp. 354–358. Discussion of paper by J. H. Holloway, H. A. Huebotter and G. A. Young, published in Jan. 1923 issue.

Vegetable-Oil Fuel. Vegetable Oils in Internal-Combustion Engines (Utilisation des huiles végétales dans les moteurs à combustion interne), L. A. Charles. Chaleur & Industrie, vol. 4, no. 34, Feb. 1923, pp. 125–128, 4 figs. Difference in combustion of vegetable oils; application to Diesel engines; advantages of mechanical over solid injection; results of tests.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES.]

IRON ALLOYS

Iron-Arsenic. Contribution to the Study of Iron-Arsenic Alloys (Beitrag zur Kenntnis der Eisen-Arsen-Legierungen), P. Oberhoffer and A. Gallaschik. Stahl u. Eisen, vol. 43, no. 12, Mar. 22, 1923, pp. 398–400, 6 figs. Investigation of diagram of state of alloys with 0 to 8 per cent arsenic.

IRON AND STEEL

Corrosion and Oxidation. Corrosion and Oxidation of Iron and Steel, T. S. Fuller. Power House, vol. 16, no. 5, Mar. 5, 1923, pp. 30–31. Cause of corrosion, showing some earlier theories advanced to account for phenomena; composition of metal has much to do with this action.

Corrosion-Resisting. Corrosion-Resisting Irons and Steels, James A. Aupperle. Chem. & Met. Eng., vol. 28, no. 15, Apr. 16, 1923, pp. 681–682. Discussion of corrosion resistance of pure iron, chromium steel and silicon cast irons. See also articles by Pierce D. Schenck, entitled Acid-Resisting Irons, p. 678, 3 figs.

IRON CASTINGS

Defects. Surface and Internal Defects in Iron Castings, J. E. Fletcher. Foundry Trade Jl., vol. 27, nos. 342 and 344, Mar. 8 and 22, 1923, pp. 200–201 and 235–236 and (discussion) 236–237. Their relationship, cause and cure.

Electric-Furnace Iron for. Advantages of Basic-Electric-Furnace Iron for Castings to Resist Abrasion, Larry J. Barton. Eng. & Min. Jl.-Press, vol. 115, no. 14, Apr. 7, 1923, pp. 628–630, 2 figs. So-called synthetic iron, made in electric furnace, said to be much more satisfactory for crusher jaws, ball mill liners, roll shells, and other parts.

Gray Iron. Some Notes on Grey-Iron Castings, M. Benbow. Foundry Trade Jl., vol. 27, no. 345, Mar. 29, 1923, p. 250. Notes on pouring cylindrical castings; casting temperatures; surface defects; cupola troubles, core oils and sands.

Shrinkage Faults. Shrinkage Faults in Castings, Walter J. May. English Mechanic & World of Sci., vol. 117, no. 3022, Feb. 23, 1923, p. 53. Causes and remedies of shrinkage faults.

Test Bars. The Value and Relation of Test-Bars to Castings, S. G. Smith. Foundry Trade Jl., vol. 27, no. 345, Mar. 29, 1923, pp. 248–250. Admiralty and other specifications; test pieces for fuse bodies; standard test bars.

Tunnel Segments. Tunnel Segments Big Contract. Foundry, vol. 51, no. 7, Apr. 1, 1923, pp. 260–263, 8 figs. Manufacture of gray-iron and steel castings for lining of Hudson River vehicular tunnel. See also article entitled Jolt Machines Mold Segment Castings, in same issue, pp. 263–267, 4 figs., describing molding of cast-iron segments for vehicular tunnel on jolt-ram machines.

IRON, PIG

Shipping Methods. How Britons Ship Pig Iron to U. S. Iron Trade Rev., vol. 72, no. 12, Mar. 22, 1923, pp. 871–873, 6 figs. Details of handling and shipping arrangements at ports of Middlesborough, Barrow-in-Furness, and Glasgow.

L

LATHES

Double-End. New Double-End Lathe. Iron Age, vol. 111, no. 13, Mar. 29, 1923, p. 895, 1 fig. Both ends of rear-axle housings, drive shafts and other work turned simultaneously on Sundstrand lathe.

Relieving. Relieving Lathe Developments, I. H. Wright. Machy. (Lond.), vol. 22, no. 549, Apr. 5, 1923, pp. 9–10, 3 figs. Recent improvements in Smith & Coventry relieving lathe.

Turret. Modern Capstan Lathe Refinements, E. W. Field. Brit. Machine Tool Eng., vol. 2, no. 20, Mar.-Apr. 1923, pp. 616–619 and 626, 7 figs. Deals with salient features of attachments.

LIGHTING

Chart for Designing Illumination. Nomographic Chart for Designing Illumination, Emil Kun. Elec. World, vol. 81, no. 14, Apr. 7, 1923, pp. 801–803, 1 fig. Applicable to direct or indirect illumination using photometric curve of fixture or intensity readings in one plane.

LIGNITE

Locomotive Fuel. Brown Coals and Peat as Locomotive Fuels (Braunkohle und Torf als Lokomotivbrennstoffe), H. Landsberg. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 11, Mar. 17, 1923, pp. 263–264. Production and preparation of fuels; grinding and handling of pulverized fuel; conveyance and firing of fuel on locomotive.

Utilization. The Utilization of Lignite Coal, Bancroft Gore. Black Hills Engr. (Formerly Pahasapa Quarterly), vol. 11, no. 2, Mar. 1923, pp. 84–126, 27 figs. partly on p. 127. Review of fuel situation in South Dakota; experiments made at Mining Experiment Station burning lignite in dried and undried dust form to determine best combustion conditions; use of unit pulverizers; upgrading of lignite at mine by crushing, followed by drying and removal of dust on impact screens, is important factor in adopting this fuel for domestic and industrial purposes.

LOCOMOTIVE BOILERS

Corrosion. Protecting Boiler Parts Against Corrosion (Note sur l'usure des éléments de chaudières en service et sur un procédé de protection de ces éléments

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 126

Pumps, Filter Press
Buffalo Steam Pump Co.
* Goulds Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.

Pumps, Hydraulic
American Fluid Motors Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring
Wayne Tank & Pump Co.

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Pumps, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lunkenheimer Co.
Novo Engine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Oil, (Hand)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Divsion)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
Novo Engine Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Novo Engine Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Smidth, F. L. & Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Morris Machine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Punches, Metal Hand (Power)
* Parker-Kalon Corp'n

Punches, Multiple
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Punches, Power
* Royersford Fdry. & Mch. Co.

Punches and Dies
* Royersford Fdry. & Mch. Co.

Punching and Coping Machines
Long & Allstatter Co.

Punching and Shearing Machines
Long & Allstatter Co.
* Royersford Fdry. & Mch. Co.

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Elliott Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Superheater Co.
Taylor Instrument Cos.

Pyrometers, Optical
Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co.

Pyrometers, Radiation
Taylor Instrument Cos.

Racks, Machine, Cut
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Railways, Industrial
Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recorders, CO
* Uehling Instrument Co.

Recorders, CO_2
* Uehling Instrument Co.

Recorders, SO_2
* Uehling Instrument Co.

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Blower
* Davis, G. M. Regulator Co.

Regulators, Damper
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Parker-Kalon Corp'n

Regulators, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Feed Water
* Edward Valve & Mfg. Co.
Elliott Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Humidity
* Fulton Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Fulton Co.
* General Electric Co.
* Kieley & Mueller (Inc.)
Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
Taylor Instrument Cos.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
Long & Allstatter Co.

Roller Bearings
(See Bearings, Roller)

Rolling Mill Machinery
Mackintosh-Hemphill Co.

Rolls, Crushing
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Rolls, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
* Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
* Johns-Manville (Inc.)

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope Drives
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rubber Goods, Mechanical
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
United States Rubber Co.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Saw Rigs, Portable
Novo Engine Co.

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Water Intake (Traveling)
Chain Belt Co.
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Drive (Hardened)
* Parker-Kalon Corp'n

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker-Kalon Corp'n

Screws, Set
Allen Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H S B W Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H S B W Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Machy. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Co.

Shafting, Flexible
* Gwilliam Co.

Shafting, Turned and Polished
Cumberland Steel Co.
Link-Belt Co.

Shapes, Brick
McLeod & Henry Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Shears, Alligator
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Shears, Plate
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Sheaves, Rope
Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Sheets, Rubber, Hard
* Goodrich B. F. Rubber Co.
United States Rubber Co.

Shelving, Metal
Manufacturing Equip. & Engrg. Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
Brown, A. & F. Co.
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* Cramp Wm. & Sons Ships & Engine Bldg. Co.
DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

contre les corrosions). A. Dagory. Revue Industrielle, vol. 53, no. 17, Mar. 1923, pp. 100–104, 1 fig. Discusses particularly locomotive boilers; mechanical and chemical actions, protection of fireboxes and surfaces in contact with water with aluminium applied by calorizing process.

LOCOMOTIVES

Booster. The Locomotive Booster, John A. Talty. Southern & Southwestern Ry. Club, vol. 17, no. 1, Jan. 1923, pp. 21–49 and (discussion) 49–56 (21 pp. in all), 14 figs. Deals with lubrication and application. Results of tests.

British, 1922. British Locomotives in 1922, J. F. Gairns. Int. Ry. Congress—Bul., vol. 5, no. 3, Mar. 1923, pp. 205–223, 6 figs. Designs and work.

Locomotive Development on the Great Northern Railway (1848–1922). Ry. Gaz., vol. 38, no. 9, Mar. 2, 1923, pp. 352–353, 4 figs. Presents four outline drawings showing progress made in locomotive development on Great Northern Ry. in period of 74 years; tabular data demonstrating immense difference between first engines and latest and largest production of Doncaster works, the Pacific type locomotive.

Diesel-Electric. Railway Traction by Means of Diesel-Electric Locomotives (La traction ferroviaire par locomotrices, Electro-Diesels), J. Boudet. Vie Technique et Industrielle, vol. 4, no. 39, Dec. 1922, and vol. 5, nos. 40 and 41, Jan. and Feb. 1923, pp. 161–168, 232–236 and 299–304, 15 figs. Construction, equipment and operation of Diesel-electric locomotives on Swedish railways, Diesel-electric on railways in Saxony; Italian Diesel-electric locomotives of 1200 hp. four stroke, and 2000 hp. two stroke; comparison of steam and electric traction.

Electric. [See ELECTRIC LOCOMOTIVES.]

4-8-0. Can the 2-8-0 (or 4-8-0) Locomotive Be Further Developed? George Bulkeley. Can. Ry. Club—Official Proc., vol. 22, no. 3, Mar. 1923, pp. 21–29 and (discussion) 29–41, 5 figs. Suggestions for a 4-8-0 locomotive to meet requirements of engine for mixed-traffic purposes.

Fuel Determination. Some Fuel Determinations Made on Locomotives Operated by the Southern Pacific System, A. H. Babcock. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 4, Apr. 1923, pp. 335–342, 6 figs. Study of track over Tehachapi Pass.

Garratt Articulated. Garratt Articulated Locomotives. Ry. Age, vol. 74, no. 19, Apr. 14, 1923, pp. 959–960, 1 fig. Details of 2-6-6-2 type built for S. African railways.

Geared. Willamette Geared Locomotives. Ry. Age, vol. 74, no. 16, Mar. 24, 1923, p. 808, 1 fig. Details of locomotives built for logging purposes, with side drive and 3-cylinder vertical engine capable of developing 900 hp.

Lungström Turbine. The Ljungström Turbine Locomotive for the Swedish State Railways. Int. Ry. Congress—Bul., vol. 5, no. 3, Mar. 1923, pp. 239–239, 13 figs. Details of driving mechanism; boiler, superheater and air preheater; condenser, auxiliary apparatus; efficiency and test results.

Mallet. Simple Mallet Type Locomotives for the C. & O. Ry. Ry. Rev., vol. 72, no. 15, Apr. 14, 1923, pp. 645–647, 1 fig. Single-expansion type having 2-8-8-2 wheel arrangement; represents new development in Mallet design.

Mikado. Mikado Type Locomotives for the Lackawanna. Boiler Maker, vol. 23, no. 3, Mar. 1923, pp. 63–65, 2 figs partly on p. 62. General construction and boiler details of new heavy-type locomotives of D. L. & W.; 2-8-2 type, normal rated tractive force 67,700 lb. and equipped with boosters having rated tractive force of 11,500 lb. See also Ry. & Locomotive Engr., vol. 36, no. 4, Apr. 1923, pp. 112–113, 1 fig.

Pacific Type. "Pacific" Type Express Passenger Locomotives, London & North Eastern Railway (Great Northern Section). Ry. Engr., vol. 44, no. 518, Mar. 1923, pp. 95–100, 8 figs. General principles governing design and principal structural features of 4-6-2 type 3-cylinder locomotives.

Superheated. Converting Locomotives for Superheated Steam. Ry. Gaz., vol. 38, no. 12, Mar. 23, 1923, pp. 490–493, 8 figs. Experience on Great Northern Ry., Ireland.

Metre Gauge Locomotives, Bombay, Baroda & Central India Railway. Ry. Gaz., vol. 38, no. 13, Mar. 30, 1923, p. 522, 2 figs. 4-6-2 superheated passenger engines, having maximum adhesion weight and other special features.

The German Standard 2-10-0 Type Three Cylinder Locomotive, Desider Ledacs Kiss. Ry. & Locomotive Eng., vol. 36, no. 4, Apr. 1923, pp. 99–101, 3 figs. Standard consolidation-type freight engine is equipped with Schmidt superheater and feedwater preheater.

LOOMS

Mechanisms. Looms, Driving, Reversing, Stopping, and Starting, and Loom Shedding-Mechanism and Pattern Cards, Chains, Surfaces, and the Like. Abridgments of Specifications, class 142 (i), period 1909–15, 1923, 178 pp. Patents for inventions.

LUBRICANTS

Graphite. Recent Developments in Lubrication with Special Reference to Graphite, J. Thomas. Min. & Geol. Inst. of India—Trans., vol. 17, part 2, Nov. 1922, pp. 93–109 and (discussion) 109–113, 7 figs. partly on supp. plates. Notes on friction, liquid, solid and semi-solid lubricants; colloid solid lubricants; advantages of graphite as lubricant.

LUBRICATION

Researches. Some Recent Researches on Lubrication, T. E. Stanton. Instn. Mech. Engrs.—Proc., vol. 2, no. 6, Dec. 1922, pp. 1117–1145, 8 figs. Present position of problem; review of Reynolds theory; experimental investigation of characteristics of cylindrical journal lubrication under limiting conditions of pressure; conclusions based on tests.

M

MACHINE TOOLS

Chain Drive. Application of Chain Drives to Machine Tools. Can. Machy., vol. 29, no. 11, Mar. 15, 1923, pp. 20–22, 8 figs. Typical example of chain-drive efficiency; direct drives from motor to machine, and drive from lineshaft to machine; proper care.

Design. Methods of Machine Tool Design, A. L. DeLeeuw. Am. Mach., vol. 58, no. 8, Mar. 22, 1923, pp. 297–300, 8 figs. Use of hydraulic and pneumatic devices in feed mechanisms; friction drives of simple and complex design; Sellers friction.

Drive of Reciprocating Members. Weight and Spring-Driven Reciprocating Members, W. R. Gilpin. Machy. (Lond.), vol. 21, no. 546, Mar. 15, 1923, pp. 746–747, 1 fig. Advantages of weight drive: (1) uniform pull, (2) simplicity of application, (3) durability; advantages of spring drive: (1) comparative absence of inertia, (2) rapidity of action, (3) convenience of application.

German. New Machine Tools Exhibited at the Leipzig Spring Exposition 1923. (Neue Werkzeugmaschinen auf der Leipziger Frühjahrsmesse 1923), Hans D. Brasch. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 9, Mar. 3, 1923, pp. 201–205, 19 figs. Review of exhibits and most important improvements.

Hydraulic-Transmission Drive. Hydraulic-Transmission Variable-Speed Drive for Machine Tools and Manufacturing Processes, Walter Ferris. Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 238–241 and (discussion) 241 and 245, 10 figs. Application of Oilgear transmission to machine-tool driving, broaching, hydraulic presses, etc. (Abridged.)

Large. Design and Construction of Large Machine Tools, Geo. H. Benzon, Jr., Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 215–219, 8 figs. Limitations imposed on design by materials and available shop equipment; problems involved in design and construction of large boring mills and planers.

MACHINERY

Experimental, Controlling Costs of. Controlling Costs in Building Experimental Machines, Fred H. Colvin. Am. Mach., vol. 58, nos. 12, 14 and 16, Mar. 22, Apr. 5 and 19, 1923, pp. 429–431, 503–507 and 589–591, 20 figs. Method that saves expensive shopwork, prepares for future manufacture, and shows and controls costs at all times. Apr. 5: How tools were decided upon and operation times set; system of low-cost pictorial drawing; Apr. 19: How engineering changes are recorded; stock lists and complete record of all departments.

Holland, Manufacture in. The Dutch Machine Manufacturer, Henry Obermeyer and Arthur L. Greene. Am. Mach., vol. 58, no. 14, Apr. 5, 1923, pp. 521–524, 4 figs. Overcoming natural obstacles and solving contemporary problems in Holland; Diesel-engine construction; labor problems.

Wage Cost of. The Wages Paid to Machinery, Warren B. Lewis. Indus. Management (N. Y.), vol. 65, no. 4, Apr. 1923, pp. 240–242. Discusses element of manufacturing cost which, it is claimed, is too often overlooked.

MAGNESIUM ALLOYS

Mechanical Properties. The Mechanical Properties of Magnesium Alloys, Leslie Aitchison. Inst. of Metals advance paper, no. 1, for meeting Mar. 7–8, 1923, 5 pp., 2 figs. Results of tests made upon electron metal and various other alloys of magnesium. See also (abstract) in Metal Industry, vol. 22, no. 10, Mar. 9, 1923, pp. 222–223, 2 figs.

MALLEABLE IRON

Electric Production. Malleable Cast Iron and Its Production in the Electric Furnace, E. F. Collins. Nat. Elec. Light Assn. Bul., vol. 9, no. 11, Nov. 1922, pp. 699–702, 4 figs. General nature of malleable iron and laws governing its production; advantages which electric heat offers malleable iron foundryman.

MARINE BOILERS

Scotch. The Efficiency of the Scotch Marine Boiler, C. J. Jefferson. Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 220–222, 8 figs. Results of coal- and oil-burning tests made by U. S. Shipping Board and Bur. of Mines showing high combined efficiencies of boiler, superheater and air heater that are obtainable with careful operation. (Abridged.)

MARINE STEAM TURBINES

Geared. Notes on the Economical Performance of Turbine Installations in Merchant Ships, T. C. Potts. North-East Coast Instn. Engrs. & Shipbldrs., advance paper, no. 2710R, for meeting Mar. 16, 1923, 11 pp., 4 figs. Résumé of consumption trials carried out in geared-turbine vessels under ordinary seagoing conditions, and points affecting efficient running of turbine installations under such sea-going conditions.

Mechanical Gearing. Mechanical Gearing, Charles A. Parsons, Stanley S. Cook and H. M. Duncan. Engineering, vol. 115, no. 2987, Mar. 30, 1923, pp. 408–411, 7 figs. Based on experiments, it is concluded that oil quenching of large masses of nickel steel introduces risks of cracks and excessive strains and should be discontinued for turbine gears; consideration of effect of error in cutting of teeth. (Abstract.) Paper read before Instn. Nav. Architects. See also Engineer, vol. 135, no. 3509, Mar. 30, pp. 349–650.

METALS

Cold Working. Essential Factors in Cold Working and Recrystallization According to Tests on Metallic Bodies From Powdered Material (Ueber die wesentlichen Faktoren bei Kaltbearbeitung und Rekristallisation nach Versuchen an metallischen Körpern aus pulverförmigem Material), F. Sauerwald. Zeit. für Elektrochemie, vol. 29, no. 2, Feb. 1, 1923, pp. 79–85. Grain growth; crystallization process after cold working; iron and copper.

The Modulus of Direct Elasticity of Cold-Drawn Metals as a Function of Annealing Temperature, F. C. Lea, V. A. Collins and E. A. F. Reeve. Am. Inst. of Metals advance paper, no. 14, for meeting Mar. 7–8, 1923, 17 pp., 7 figs. Experiments on brass tubes; comparison of results with similar results for steel tubes. Includes appendix dealing with annealing of tubes.

Deformation and Fracture. Permanent Deformation and Fracture of Metals by Elongation or Compression (Sur les déformations permanentes et les cassures des métaux par traction ou compression), A. H. Leblond. Technique Moderne, vol. 15, no. 1, Jan. 1, 1923, pp. 7–11, 24 figs. Results of experiments with test bars of steel, cast iron, brass, and bronze.

Fatigue. Fatigue in Metals, C. F. Jenkin. Roy. Aeronautical Soc.—Jl., vol. 27, no. 147, Mar. 1923, pp. 89–99 and (discussion) 99–104, 12 figs. Account of Author's experiments with a model.

High-Temperature. Metals for High Temperature, F. A. Fahrenwald. Chem. & Met. Eng., vol. 28, no. 15, Apr. 16, 1923, pp. 680–681. Points out that no one alloy can be used as standard; each has its limitations which must be appreciated in order to ward off failure; discusses mechanical properties at high temperatures.

Oxidation. The Oxidation of Metals at High Temperatures, N. B. Pilling and R. E. Bedworth. Am. Inst. of Metals advance paper, no. 17, for meeting Mar. 7–8, 1923, 54 pp., 53 figs. Oxidation a phase of corrosion; oxidation reaction; classification of metals; study of typical metals of known purity.

MILLING CUTTERS

Stellite. Stellite Cutters for Milling, C. W. Metzger. Machy. (N. Y.), vol. 29, no. 8, Apr. 1923, pp. 589–593, 13 figs. Design of cutters for milling different metals, and directions for grinding clearance on teeth.

Time-Saving. Time-Saving Milling Cutters. Eng. Progress, vol. 4, no. 4, Apr. 1923, p. 78, 4 figs. Describes milling cutters, in which cutting teeth are backed off, so that they will not lose their shape when being reground.

MONEL METAL

Annealing. Annealing Monel Metal. Forging & Heat Treating, vol. 9, no. 3, Mar. 1923, p. 150. Directions and suggestions.

Corrosion-Resisting Properties. Nickel and Monel Metal, R. J. McKay. Chem. & Met. Eng., vol. 28, no. 15, Apr. 16, 1923, pp. 686–687. Properties which give these metals unique value in corrosion-resisting work.

MOTION STUDY

Repetitive Processes. Rhythm in Machine Processes, A. Whitehead. Indus. Management (Lond.), vol. 9, no. 6, Mar. 22, 1923, pp. 169–173, 4 figs. Deals with application of motion study to engineering operations, particularly with regard to repetitive processes; how rhythm makes for and sustains operating speed is shown in charts.

MOTOR BUSES

Gasoline-Electric. A New Petrol-Electric 2-Tonner. Motor Transport, vol. 36, no. 938, Feb. 19, 1923, p. 239, 1 fig. Combination of Thornycroft B. T. chassis and Stevens electric transmission; specially suitable for passenger-carrying services.

Problems. Motor Coaches. Motor Transport (Lond.), vol. 36, no. 942, Mar. 19, 1923. Contains following articles: Fares and Plans of some of the Principal Metropolitan Coach Undertakings for the Coming Season, pp. 341–342, 3 figs. Variety in Seat Planning, p. 343, 6 figs. On Weather Protection, pp. 345–346, 7 figs. Smaller Coach Chassis, pp. 347–348, 4 figs. Coach Stations at Blackpool, pp. 351–353, 3 figs. Motor Coach Tyres, pp. 354–356, 10 figs. Brakes for Coaches, pp. 357–358, 2 figs. Continental Touring, pp. 359–360. The Petrol-Electric Coach, pp. 365–366, 4 figs. Concerning Wireless for Coaches, pp. 368–369.

MOTOR TRUCKS

German Type. Front Wheel Drive Truck Features Gearset with Hydraulic Control, Benno R. Dierfeld. Automotive Industries, vol. 48, no. 14, Apr. 5, 1923, pp. 759–762, 8 figs. German truck chassis brought out by Lippische Werkstätten; advantages said to be freedom from skidding, low unsprung weight and ability to use exceptionally low body; specially suited to bus purposes.

Guy. Guy Petrol Vehicles. Motor Transport, vol. 36, no. 941, Mar. 12, 1923, pp. 313–315, 8 figs. Models from ¾-ton to 3 tons load capacity built on similar lines throughout; variety of standardized body types.

Producer-Gas. Producer-Gas Trucks (Les camions à gaz pauvre), Ch. Dantin. Génie Civil, vol. 82,

Manufactured by Advertisers CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 136

Lammert & Mann Co.
Mackintosh-Hemphill Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* Cleveland Worm & Gear Co.
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* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Poole Engrg. & Mch. Co.

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* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Fuller-Lehigh Co.
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* Hendrick Mfg. Co.
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* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

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* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

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Heine Chimney Co.

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* Crane Co.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.

Steel, Cold Rolled
Cumberland Steel Co.
* Union Drawn Steel Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Falk Corporation
* Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
* Union Drawn Steel Co.

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* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Keeler, E. Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

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* Vogt, Henry Machine Co.

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Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

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* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
Green Engineering Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Overfeed
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

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Manufacturing Equipment & Engrg. Co.

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* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

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* Kieley & Mueller (Inc.)

Strainers, Water
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* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

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* Walsh & Weidner Boiler Co.

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* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

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* Westinghouse Electric & Mfg. Co.

Switches, Electric
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* Westinghouse Electric & Mfg. Co.

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(See Converters, Synchronous)

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Dietzgen, Eugene Co.
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Weston Electrical Instrument Co.

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* Walsh & Weidner Boiler Co.

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* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
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* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
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* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

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* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

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* Brownell Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
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Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
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* Bristol Co.
* Sarco Co. (Inc.)
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Taylor Instrument Cos.

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Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.

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* Fulton Co.
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
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* Landis Machine Co. (Inc.)

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Tools, Pneumatic
* Ingersoll-Rand Co.

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Track, Industrial
Northern Engineering Works

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* Allis-Chalmers Mfg. Co.

Tractors, Turntable
Whiting Corp'n

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* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
Whiting Corp'n

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Transmissions, Variable Speed
American Fluid Motors Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Treads, Stair (Rubber)
United States Rubber Co.

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n
Whiting Corp'n

Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.

Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Tubing, Rubber (Hard)
* Goodrich, B. F. Rubber Co.

Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mch. Co.
Whiting Corp'n

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy. Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Elec. & Mfg. Co.

Turbo-Blowers
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Turbo-Compressors
* Ingersoll-Rand Co.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Electric & Mfg. Co.

Turbo-Pumps
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

nos. 5 and 6, Feb. 3 and 10, 1923, pp. 100-103 and 130-133, 22 figs. Describes trucks at recent Automobile Club show, France.

Six-Wheel. A New Semi-Trailer. Motor Transport (Lond.), vol. 36, no. 939, Feb. 26, 1923, pp. 251-252, 2 figs. Six-wheeled vehicle comprising 40-hp. Leyland short-wheelbase chassis and Carrimore semi-trailer having specially low loading platform, fitted with Westinghouse air-pressure brakes.

Tipping Devices. The Universelle Unloading System. Motor Transport (Lond.), vol. 36, no. 941, Mar. 12, 1923, pp. 317-318, 4 figs. Hydraulically-operated three-way tipping mechanism incorporating ingenious hinge device, can be installed on any make of chassis, petrol-, electric- or steam-driven.

MOTORCYCLES

Side-Car Design. Sidecar Design, Douglas Leechman. Automobile Engr., vol. 13, no. 174, Mar. 1923, pp. 78-82, 19 figs. Consideration of functions of side car and bicycle frame. Future development.

N

NON-FERROUS METALS

Scrap. The Status of Secondary Non-Ferrous Metals, W. M. Corse. Raw Materials, vol. 6, no. 1, Apr. 1923, pp. 136-137. Notes on practical non-ferrous scrap metallurgy; work of Navy Dept. in scientific utilization of scrap metals.

NOZZLES

Steam. Action of. First Report of the Steam-Nozzle Research Committee. Instn. Mech. Engrs. Proc., no. 1, Jan. 1923, pp. 1-22, 12 figs. Account and results of experiments relating to action of steam passing through nozzles and steam turbines.

O

OIL ENGINES

British Industry. Stationary Oil Engine Industry in Great Britain, J. L. Chaloner. Oil Engine Power, vol. 1, no. 3, Mar. 1923, pp. 147-150. Review of present situation and progress to date; 34 manufacturers and 64 designs.

Gernandt. Modification of the Diesel Principle for Low Power. Oil Engine Power, vol. 1, no. 3, Mar. 1923, p. 127, 1 fig. Details of two-cycle Gernandt oil engine, a small engine capable of burning many grades of oil with economy of larger Diesel; has no fuel pump, also built in 4-cycle type.

High-Speed. High Speed Oil Engines, J. L. Chaloner. Automobile Engr., vol. 13, no. 174, Mar. 1923, pp. 84-95, 22 figs. Suggested system of classification of liquid fuel internal-combustion engines. Internal combustion high-speed oil engines: designing data; constructional details; power and test records; automobile oil engine. Fuel specification in light of oil-engine practice. (Abstract.)

Marine. A 90 Hp. Six-Cylinder Marine Engine. Automobile Engr., vol. 13, no. 174, Mar. 1923, pp. 66-74, 15 figs. Details of engine designed for lifeboat service; vertical water-cooled, totally enclosed unit having six cylinders 5½-in. bore by 7-in. stroke and rated nominally at 80 b.hp.

Some Types of Marine Oil-Engines, E. T. Vincent. Instn. Mech. Engrs.—Proc., no. 1, Jan. 1923, pp. 37-45, 3 figs. Deals with Doxford, Cammellaird-Fullagar and particularly with Still engines.

Slow-Speed. 1600 B.H.P. Four Cycle Engine of the Maschinenfabric Augsburg-Nurnberg (MAN), Augsburg Works. Eng. Progress, vol. 4, no. 3, Mar. 1923, pp. 45-50, 7 figs. Low- vs. high-speed engines; power and design of low-speed engines; working piston, valves and pumps; engine control; test results; vibration and strain tests.

OIL FUEL

Analysis and Treatment. Examination, Treatment and Characteristics of Fuel Oils (Beurteilung, Behandlung und Charakteristik der Heizole), Franz Stanek. Feuerungstechnik, vol. 11, no. 6, Dec. 15, 1923, pp. 61-65, 2 figs. Methods of investigation; storage; products of anthracite and lignite tar.

Burners. The Automatically-Controlled Cuenod Burner for Liquid Fuels (Brûleur "Cuénod" à réglage automatique pour combustible liquide). Bul. Technique de la Suisse Romande, vol. 49, no. 6, Mar. 17, 1923, pp. 65-70, 3 figs. Manufactured by H. Cuenod at Geneve-Chatelaine; details of design and construction. See also Génie Civil, vol. 82, no. 12, Mar. 24, 1923, pp. 284-285, 1 fig.

Handling Bulk Quantities. Handling Bulk Quantities of Fuel Oils, Robert June. Power Plant Eng., vol. 27, no. 7, Apr. 1, 1923, pp. 366-367, 2 figs. Piping arrangements, heating, pumping and measuring facilities that have proved successful.

Installations. How to Install and Operate a Fuel Oil System, James D. Lalor. Am. Ceramic Soc.—Jl., vol. 6, no. 2, Feb. 1923, pp. 448-459 and (discussion) 459-461, 9 figs. How to install fuel-oil system to meet requirements of Board of Fire Underwriters so as to obtain lowest rate of insurance on plant and insuring continuous operation; proper type of system to install to insure good product with lowest possible expenditure of power and fuel.

OPEN-HEARTH FURNACES

Manganese, Behavior of. The Behavior of Manganese in the Basic Open-Hearth Process (Das Verhalten des Mangans im basischen Herdfrischverfahren), Paul Oberhoffer and Fritz Koerber. Stahl u. Eisen, vol. 43, no. 10, Mar. 8, 1923, pp. 329-334, 7 figs. Return of manganese from slag to bath; influence of basicity of slag, ore addition, quantity and form of manganese in charge, and of carbon content in bath; dependence of period of melting and temperature increase of bath on carbon content; dependence of strength and expansion on casting temperature. Results of tests.

Railroad Castings. Making Steel in Java. Iron Age, vol. 111, no. 12, Mar. 22, 1923, p. 820, 3 figs. Open-hearth plant at Batavia utilizing scrap principally for railroad castings; surplus sold partly for forging work.

OXY-ACETYLENE WELDING

Essentials of. Fusion Welding—Getting Results, H. S. Card. Car Foremen's Assn. of Chicago—Official Proc., vol. 17, no. 5, Feb. 1923, pp. 31-37, 40, 43-46, 49-52, 55-58, 61-63 and (discussion) 63-64, 67-70 and 73-74, 7 figs. Essentials to good oxy-acetylene welding; preparing weld; causes and remedies of most common defects; oxygen and acetylene cylinders, regulators and torches; annealing.

P

PEAT

Firing in Industrial Plants. Peat Firing (Torffeuerung), H. Moritz. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 11, Mar. 17, 1923, pp. 262-263, 2 figs. Conditions under which peat can be used as fuel in large industrial plants and suitable furnace arrangements for its economical use.

PRESSES

Safety Devices. Safety in Industrial Work (La sécurité du travail industriel). Usine, vol. 32, no. 7, Feb. 17, 1923, p. 19, 7 figs. Describes safety devices for presses and punching machines.

Tools. A Set of Progressive Operation Press Tools, Fred E. Johnson. Am. Mach., vol. 58, no. 14, Apr. 5, 1923, pp. 509-510, 2 figs. Designed for quantity production of small sheet-metal clips; press runs continuously.

PULVERIZED COAL

Boiler Firing. New Arrangements and Experiences in Pulverized Coal Firing (Neuere Einrichtungen und Erfahrungen auf dem Gebiete der Kohlenstaubfeuerung), F. Schulte. Glückauf, vol. 59, nos. 9 and 10, Mar. 3 and 10, 1923, pp. 205-208 and 240-247, 13 figs. Pulverizing; conveying of powdered coal; burners; combustion; types of furnace construction; results of tests with pulverized coal firing; advantages and drawbacks.

Pulverized Coal Firing (Ueber Kohlenstaubfeuerungen), P. Meller. Elektrische Kraftbetriebe u. Bahnen, vol. 20, no. 20, Oct. 24, 1922, pp. 225-226. Drying, pulverizing, conveying; combustion; technical difficulties.

The Fuller Pulverized Coal Firing System (Die Fuller-Kohlenstaubfeuerung), Otto Wulf. Warme, vol. 46, nos. 4 and 5, Jan. 26 and Feb. 2, 1923, pp. 35-38 and 48-50, 12 figs. Nature of pulverized coal firing; suitable fuels; preparation of coal; Fuller rotary dryers and pulverizers; feeding pulverized coal; injection nozzles; horizontal and vertical boilers; describes plant designed by Fuller Eng. Co. and carried out by Berlin-Anhalt Maschinenbau, A. G.

Equipment. System of Pulverized Coal Meets Specific Needs, W. B. Roberts. Power House, vol. 16, no. 4, Feb. 20, 1923, pp. 23-27, 4 figs. Principal advantages of pulverized coal; most suitable coals; describes Quigley pulverized fuel equipment, a system complete with appliances for preparing, distributing and burning powdered coal; results of 11 steaming tests on Edge Moor boilers, burning powdered coal, at Oneida St. power station, Milwaukee.

PUMPS

Air Lifts. The Paradox of the Air Lift in Action, Frank Richards. Power, vol. 57, no. 16, Apr. 17, 1923, pp. 591-593, 4 figs. Explains what actually happens in air lift.

Vacuum. High-Vacuum Pumps (Ueber Hochvakuumpumpen), Alfred Schacht. Fördertechnik u. Frachtverkehr, vol. 16, no. 3, Feb. 2, 1923, p. 29, 1 fig. Describes Elmo rotary pump, built by Siemens-Schuckert, and use of McLloyd vacuum meter in connection with it.

PUMPS, CENTRIFUGAL

Diesel-Engine-Driven. Diesel-Engine-Driven Centrifugal Pumps Irrigate 50,000 Acres in India, J. A. Colaco. Eng. News-Rec., vol. 90, no. 16, Apr. 19, 1923, p. 702. Describes Divi pumping station employed in irrigation system connected with Godavari and Kistna Rivers.

R

RAILS

Fracture. The Breakage of Rails, Georges Charpy and Jean Durand. Ry. & Locomotive Eng., vol. 36, no. 4, Apr. 1923, pp. 123-124, 1 fig. (Abstract.) Report of investigation by French engineers presented to Acad. of Sci. in France.

RAILWAY ELECTRIFICATION

Austria. Electrification of Austrian Alpine Railways (Die Elektrisierung der österreichischen Alpenbahnen), Rudolf Mossmann. Verkehrstechnik, vol. 40, nos. 10 and 11, Mar. 9 and 16, 1923, pp. 73-74 and 84-85, 2 figs. Electrification of the various lines, including Innsbruck-Bregenz and hydroelectric development to supply current.

France. French Progressing with Electrification Projects, J. C. Thirwall. Elec. Ry. Jl., vol. 61, no. 10, Mar. 10, 1923, pp. 410-411. Comments on developments under way on three great transportation systems; fuel savings through electrification.

Germany. The Electrification of Railways in Germany. Eng. Progress, vol. 4, no. 4, Apr. 1923, pp. 71-73, 3 figs. Review of five systems in use: one in Baden, two in Bavaria and two in Prussia.

Hungary. Electrification of the Hungarian State Railways, L. von Verebely. Engineer, vol. 135, no. 3508, Mar. 23, 1923, p. 318. Electrification plans and reasons leading to adoption of 50-cycle, split-phase system. Abstracted and translated from Elektrotechnik u. Maschinenbau, vol. 41, p. 41.

India. Electrification of Bombay Suburban Lines, Great Indian Peninsula Railway. Ry. Gaz., vol. 38, no. 11, Mar. 16, 1923, pp. 451 and 458, 1 fig. Description of scheme.

Paris Suburban Traffic. The Suburban Traffic Problem of Paris. Ry. Gaz., vol. 38, no. 11, Mar. 16, 1923, pp. 452-456, 3 figs. Batignolles tunnel at Saint-Lazare station, Paris, now being opened out and suburban line electrified; nature of traffic problem and extent of present scheme.

RAILWAY MAINTENANCE

Labor Saving. How the Lehigh Valley Gets More Work With Less Men, G. L. Moore. Ry. Eng. & Maintenance, vol. 19, no. 3, Mar. 1923, pp. 92-99, 12 figs. Description of methods which have been developed to increase output of forces employed, including utilization of locomotive cranes, adoption of tie tampers, heavy rail, treated ties, rail anchors, etc.

E. J. & E. Equipment Earns 125 Per Cent on the Investment. Frank H. Masters. Ry. Eng. & Maintenance, vol. 19, no. 3, Mar. 1923, pp. 107-109, 4 figs. Description of some labor-saving devices of Elgin, Joliet & Eastern Ry., and saving effected by their use.

Opportunities for Further Development of Labor-Saving Devices. Ry. Eng. & Maintenance, vol. 19, no. 3, Mar. 1923, pp. 100-104, 2 figs. Three articles pointing out needs for additional equipment and more general use of existing machines: Opportunities in Track Work, B. M. Cheney; Possibilities in Bridge Work, J. S. Huntoon; and Cost Analysis Promotes Use of Equipment, James Sweeney.

RAILWAY MOTOR CARS

Diesel-Electric. A New Railway Motor Car of Standard Gage (Una nuova automotrice per ferrovie a scartamento normale), P. Ostertag. Ingegneria, vol. 2, no. 2, Feb. 1, 1923, pp. 39-42, 11 figs. Describes Sulzer Diesel-electric car of 200 to 250 hp. at 440 r.p.m.; speed 70 km.p.h.; Ward-Leonard distribution; construction and operation, and results of tests.

Sulzer Diesel-Electric Rail Motor Car. Ry. Elec. Engr., vol. 14, no. 3, Mar. 1923, pp. 81-82, 1 fig. Car with 200-hp. Diesel engine seats 69 passengers and shows low fuel consumption on Swiss railways.

Six-Cylinder. Rail Car with Six-Cylinder Engine Used Successfully Nine Years, Lawrence H. Kirk. Automotive Industries, vol. 48, no. 14, Apr. 5, 1923, pp. 775-776, 2 figs. Drive is by bevel gears and chains to both axles of forward truck; full-speed range available either forward or reverse.

RAILWAY OPERATION

Freight-Train Resistance. Freight Train Resistance and Tonnage Ratings, Richard J. McCarty, Jr. Ry. Mech. Engr., vol. 97, nos. 2, 3 and 4, Feb., Mar. and Apr., 1923, pp. 83-86, 146-150 and 204-207. Feb.: Method of determining adjustment factor and applying it under various operating conditions. Mar.: Formula for adjusted ratings, selection of values and analysis of adjustment. Apr.: Importance of care in selecting values for adjustment; effect of car weight, weather and temperature.

Train Control. Automatic Control Company's Apparatus Is Tested on Big Four. Ry. Signal Engr., vol. 16, no. 4, Apr. 1923, pp. 162-164, 6 figs. Describes train-control apparatus of electrically-controlled mechanical trip type, essentially an all-air equipment, and tests made.

Test of the Automatic Control Company's Device. Ry. Age, vol. 74, no. 17, Mar. 31, 1923, pp. 861-862, 5 figs. All-air type of train-control equipment operated by movable trip demonstrated on Big Four.

The Federal Automatic Train Control. Ry. Signal Engr., vol. 16, no. 4, Apr. 1923, pp. 164-165, 1 fig. Describes system developed by Federal Signal Co., based on fundamental principle of closed circuit operation and providing continuous indication of conditions ahead of train from track rails in advance.

RAILWAY SIGNALING

Maintenance System. Signal Maintenance on an Oregon Railway, H. J. Charters. Elec. Ry. Jl., vol. 61, no. 11, Mar. 17, 1923, pp. 468-471, 4 figs. Excellent results obtained by Portland Ry., Light & Power Co. by systematic inspection and repair work, which covers all devices of warning character used to protect patrons and expedite operation.

REAMERS

Manufacture. Manufacture of Adjustable Reamers, James B. Dillard. Machy. (N. Y.), vol. 29, no. 8,

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 136

Turntables
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Unions
* Crane Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Unloaders, Car
Link-Belt Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Edward Valve & Mfg. Co.
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
United States Rubber Co.

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Fulton Co.
* Jenkins Bros.
* Simplex Valve & Meter Co.
* Smith, H. B. Co.

Valves, Air, Relief
* Fulton Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Altitude
* Simplex Valve & Meter Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
* Crane Co.
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schutte & Koerting Co.

Valves, Blow-off
* Ashton Valve Co.
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
Elliott Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Butterfly
* Chapman Valve Mfg. Co.
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Valves, Check
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Electrically Operated
* Chapman Valve Mfg. Co.
* Dean, Payne (Ltd.)
* General Electric Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Exhaust Relief
* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.

Valves, Float
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Simplex Valve & Meter Co.

Valves, Foot
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Worthington Pump & Machy. Corp'n

Valves, Gate
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Vogt, Henry Machine Co.

Valves, Hose
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valve , Hydraulic
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Hydraulic Operating
* Chapman Valve Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Plug
* Chapman Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Pump
* Bowser, S. F. & Co. (Inc). (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
United States Rubber Co.

Valves, Radiator
* American Radiator Co.
* Crane Co.
* Dean Payne (Ltd.)
* Fulton Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Radiator, Packless
* American Radiator Co.
* Fulton Co.

Valves, Reducing
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
Elliott Co.
* Fulton Co.
* Kieley & Mueller (Inc.)

Valves, Regulating
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Edward Valve & Mfg. Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Simplex Valve & Meter Co

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Stop & Check
(See Valves, Non-Return)

Valves, Superheated Steam (Steel)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Thermostatically Operated
* Dean, Payne (Ltd.)
* Fulton Co.

Valves, Throttle
* Crane Co.
* Hooven, Owens, Renstchler Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Ventilating Systems
* American Blower Co.
Clarage Fan Co.

Voltmeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Vulcanizers
* Bigelow Co.

Wash Bowls
Manufacturing Equipment & Engrg. Co.

Washers, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Water Columns
* Ashton Valve Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Water Purifying Plants
* Graver Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
* Graver Corp'n
* H S B W-Cochrane Corp'n
International Filter Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.
Wayne Tank & Pump Co.

Water Wheels
(See Turbines, Hydraulic)

Waterbacks, Furnace
Green Engineering Co.

Waterproofing Materials
* Johns-Manville (Inc.)
Texas Co.

Wattmeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Welding and Cutting Work
Linde Air Products Co.

Welding Equipment, Electric
* General Electric Co.

Wheels, Car
* Fuller-Lehigh Co.

Wheels, Polishing Paper
Rockwood Mfg. Co.

Whistles, Steam
* Ashton Valve Co.
Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Winches
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.

Wire, All Metals
Drivet-Harris Co.

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Flat
* Roebling's, John A. Sons Co.

Wire, Iror and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* General Electric Co.
* Roebling's, John A. Sons Co.
United States Rubber Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

Worm Gear Drives
* Cleveland Worm & Gear Co.
* Foote Bros. Gear & Mach. Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A., Fdy. & Mach. Co.
Link-Belt Co.

Wrenches
* Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Apr. 1923, pp. 598-601, 10 figs. Operations performed on body, nuts, and blades.

Standardized. Successful Standardized Machine Reamers. Frederic Cooke. Machy. (London), vol. 21, nos. 544 and 546, Mar. 1 and 15, 1923, pp. 689-691 and 753-755, 5 figs. Describes and gives in tabulated form design of range of machine reamers from $\frac{1}{2}$ in. to $3\frac{3}{4}$ in., which, under test, have proved successful. Mar. 1: Features of positive rake and unequally spaced teeth. Mar. 15: Adjustable inserted Blade reamers; adjustable shell reamers.

REFRACTORIES

Durability. The Durability of Refractories, W. J. Rees. Roy. Soc. of Arts—Jl., vol. 71, no. 3671, Mar. 30, 1923, pp. 338-348 and (discussion) 348-353, 8 figs. Analysis and classification of failures; variations in chemical composition and principal physical properties of most important refractories; factors on which durability is dependent. Bibliography.

Properties and Manufacture. Refractory Materials (Les materiaux refractaires), H. Drouot. Technique Moderne, vol. 15, nos. 1, 2, 3, 4, 5 and 6, Jan. 1, 15, Feb. 1, 15, Mar. 1 and 15, 1923, pp. 1-6, 37-43, 71-75, 104-111, 144-148 and 170-176, 60 figs. General properties; principal methods of manufacture; ratatory crushers, grinders, screens, mixers, molding machines, brick-cutting machines, drying furnaces; detailed discussion of various materials and their application; selection of refractory materials; acceptance tests. Bibliography.

The Properties and Testing of Refractories (Die Eigenschaften und die Prufung feuerfester Stoffe), Reinhold Rieke. Gas- u. Wasserfach, vol. 66, nos. 3, 4 and 5, Jan. 20, 27 and Feb. 3, 1923, pp. 33-36, 53-55 and 66-68, 4 figs. Raw materials for refractories; requisites and properties of refractories; chemical composition, structure, specific weight, strength at ordinary temperature, melting capacity, specific heat, heat conductivity, volume changes with heating, resistance to change in temperature; softening under load, chemical resistance. Paper read before German Soc. of Gas & Hydraulic Engrs.

REFRIGERATING MACHINES

Air. New Maurice Leblanc Air Refrigerating Machine (Die neue Luftkaltemaschine nach Maurice Leblanc), Edmund Altenkirch. Zeit. fur die Gesamte Kalte-Industrie, vol. 30, no. 1, Jan. 1923, pp. 1-3, 5 figs. Describes Leblanc process of using air as refrigerating medium which is claimed to be able to compete successfully with ammonia process without drawbacks of latter.

REFRIGERATION

Compression Cycle. The Compression Refrigerating Cycle, H. Motz. Refrig. Eng., vol. 9, no. 9, Mar. 1923, pp. 267-274 and 279-280, 12 figs. Calculation of refrigerating effects (horsepower requirements, water requirements, etc.) of ammonia. Principles of thermodynamics underlying operation of compression refrigerating system.

ROLLING MILLS

Alloys. New Eastern Mill for Rolling Alloys, E. Cooper Wills. Blast Furnace & Steel Plant, vol. 11, no. 4, Apr. 1923, pp. 224-225, 2 figs. New hot rolling mills, built by author for Driver-Harris Co. for turning out alloy metals and steel in wire rod, strip, sheet and merchant stock.

Hot Rolling. Experimental Research on Hot Rolling of Iron (Recherches experimentales sur le lammage du fer a chaud), Norbert Metz. Revue Universelle des Mines, vol. 16, no. 5, Mar. 1, 1923, pp. 331-349, 76 figs. partly on supp. plates. Deformation of metal in rolling; experiments to explain its mechanism; difference with varying pressures; movement of particles in contact with rolls; general conclusions.

Hot-Rolling Experiments, Norbert Metz. Iron & Coal Trades Rev., vol. 106, no. 2973, Mar. 23, 1923, p. 424, 1 fig. Conclusions drawn from experiments on square and rectangular bars. Translated from Revue Universelle des Mines.

Rate of Performance. Standard Guide for the Performance of Mill Trains (Massstab fur die Leistung unserer Walzenstrassen), Wilh. Tafel and Er. Schneider. Stahl u. Eisen, vol. 43, no. 11, Mar. 15, 1923, pp. 370-374, 1 fig. Determination of theoretical or ideal hourly production, production without loss, and actual production; criticism of 31 investigated mills.

Speed and Rating. The Speed and Rating of Rolling Mills, M. E. Poncelet. Iron & Coal Trades Rev., vol. 106, no. 2874, Mar. 30, 1923, p. 461. Author suggests scheme for rolling merchant bars and other steel products.

S

SAFETY

Organization Plan. Du Pont Plant Shows Fine Safety Record. Power Plant Eng., vol. 27, no. 7, Apr. 1, 1923, pp. 353-360, 7 figs. Power department of more than 50 men at Deep Water Point, N. J., goes 3 years without lost-time accident. Plan of organization work begun in 1919.

SAND BLAST

Efficiency. The Efficiency of Sand Blasts (Leistung von Sandstrahlgeblasen), W. Kaempfer. Stahl u. Eisen, vol. 43, no. 13, Mar. 29, 1923, pp. 425-430, 14 figs. Influence of air consumption and air pressure, quantity and grade of sand, type of nozzle, etc., on performance of sand blasts; suggestions for selection of sand blasts; performance data.

SEAPLANES

Float Monoplane. The L. F. G. "Puthus." Aeroplane, vol. 24, no. 9, Feb. 28, 1923, p. 158, 1 fig. Small single-seater float monoplane seaplane developed primarily as ship-airplane by Luft-Fahrzeug-Gesellschaft, Stralsund, Germany.

SEMI-STEEL

Metallurgy. The Metallurgy of Semi-Steel—II, David McLain. West. Machy. World, vol. 14, no. 2, Feb. 1923, pp. 60-62, 8 figs. Notes on nomenclature; study of wedge sections; medium phosphorus; scientific melting; annealed semi-steel.

SPARK PLUGS

Position and Number. Investigation of the Effects on Cylinder Performance of Variation of Position and Number of Spark Plugs, R. Insley. Air Service Information Circular, vol. 5, no. 401, Feb. 15, 1923, 6 pp., 4 figs. Method and results of tests.

STANDARDIZATION

Austria. Standardization in Austria, James A. G. Pennington. Am. Mach., vol. 58, no. 8, Feb. 22, 1923, p. 288. Progress of standardization and causes that led up to it.

STANDARDS

German N. D. I. Reports. Report of the German Industrial Standards Committee (Normenausschuss der Deutschen Industrie). Maschinenbau, vol. 2, no. 10, Feb. 21, 1923, pp. N67-N78, 22 figs. Proposed standards for brass, copper and aluminum plate (cold rolled); copper and brass tubes (seamless); round, flat and square brass, copper and aluminum.

Report of the German Industrial Standards Committee (Normenausschuss der Deutschen Industrie), Maschinenbau, vol. 2, no. 11, Feb. 28, 1923, pp. N79-N83, 5 figs. Tentative proposals for drawings of tolerances and fits; copper for works material; ball bearings.

STEAM

Properties. Fundamental Properties of Steam (Sur les propriétés fondamentales de la vapeur d'eau), M. Strauven. Revue Universelle des Mines, vol. 16, nos. 4 and 5, Feb. 15 and Mar. 1, 1923, pp. 289-301 and 363-376, 2 figs. partly on supp. plate. Discusses work of Callendar and Eichelberg and compares their equations and values, including specific heat, heat of vaporization, saturation pressures and temperatures, etc.; favors Eichelberg data.

STEAM ACCUMULATORS

Ruths. First Installation of a Ruths Accumulator in Germany, J. H. Blakey. Power Plant Eng., vol. 27, no. 8, Apr. 15, 1923, p. 410. Data on cost of boiler equipment both before and after installation of accumulators at Lauchhammer establishments. Abstracted and translated from Stahl u. Eisen.

Ruths Steam Accumulator (Dr. Ruths Dampfspeicher), P. Muller. Elektrische Kraftbetriebe u. Bahnen, vol. 20, no. 18, Sept. 21, 1922, pp. 193-197, 4 figs. Advantages are: elimination of fluctuations in taking steam from boiler; uniform and economic boiler load; accumulation of excess steam; fewer boilers for same steam power; prolongs life of boiler.

STEAM-ELECTRIC PLANTS

Carpet Mill. The Power Plant and Electrical Installation of a Large Carpet Mill, H. Ketton. English Elec. Jl., vol. 2, no. 3, Jan. 1923, pp. 142-158, 15 figs. Installation in existing works of 4000 hp. of motors, together with necessary power plant, with practically no stoppage of work and with saving in costs of production, space, etc., and improvement in working conditions.

Ford River Rouge Plant. Ford Principles and Practices at River Rouge, John H. VanDeventer. Indus. Management (N. Y.), vol. 65, no. 4, Apr. 1923, pp. 205-213, 21 figs. Power plant.

Oil-Burning. Remodeling Power Plant for Fuel Oil Use. Elec. Ry. Jl., vol. 61, no. 12, Mar. 24, 1923, pp. 505-508, 5 figs. Berkshire street railway, Pittsfield, Mass., is changing over 6 boilers, using steam-atomizing system; 1,000,000-gal. oil tank, filled from tank cars by gravity, provides ample reserve supply of fuel.

Waste Elimination. Power Generation Costs Reduced 35 per cent, D. E. Druen. Elec. Ry. Jl., vol. 61, no. 11, Mar. 17, 1923, pp. 438-443, 10 figs. Elimination of waste by improvements in practices in 50,000-kw. station of Kansas City railways resulted in saving of $1000 per day, accomplished by methods readily available in many railway power plants.

STEAM ENGINES

Marine, Lubrication of. Lubrication of Marine Reciprocating Steam Engines and Auxiliaries. Lubrication, vol. 9, no. 2, 1923, pp. 13-24, 11 figs. Lubrication of main engine, jacking engine, thrust and tunnel bearings, generator sets and motors, pumps, ice machines, blowers and fans, air compressors, and ash hoists.

Tests. Steam-Consumption and Efficiency Tests on Steam Engines in 1921 (Dampfverbrauchs- und Leistungsversuche an Dampfmaschinen in Jahre 1921). Zeit. des Bayerischen Revisions-Vereins, vol. 27, no. 1, Jan. 15, 1923, pp. 1-5. Data giving results of tests on single-cylinder double- and triple-expansion engines.

Uniflow. Unaflow Engines Pump Water Economically. Power, vol. 57, no. 16, Apr. 17, 1923, pp. 584-587, 5 figs. Reasons why Philadelphia water works replaced compound engines by uniflows at Torresdale station; results of economy tests; data giving net cost of pumping water.

Uniflow Engine Principle and Design, Fred W. Bosch. Power Plant Eng., vol. 26, nos. 23 and 24, Dec. 1 and 15, 1922, pp. 1144-1146 and 1197-1196 and vol. 27, no. 2, Jan. 15, 1923, pp. 124-126, 12 figs. Dec. 1: Thermal advantages of uniflow and some of its drawbacks. Dec. 15: Methods of preventing unduly high compression; engine of improved design. Jan. 15: Application to steel industry.

STEAM GENERATION

Efficiency. Some Elements of Efficient Steam Generation, David Brownlie. Combustion, vol. 7, no. 6, Dec. 1922 and vol. 8, no. 3, Mar. 1923, pp. 323-326 and 360, and 158-162, 1 fig. Amount of money to be saved and reasons of present general inefficiency. Economical fuel utilization and economy in design of fuel-burning installations. Amount of steam or power used auxiliary to production of steam.

STEAM PIPES

Risers. Capacities of Steam Heating Risers as Affected by Critical Velocity of Steam and Condensate Mixtures, F. C. Houghten and L. Ebin. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 2, Mar. 1923, pp. 115-130, 14 figs. Recommendations based on investigation: (1): All pipe should be reamed; (2) pipe with unusually large bump, blister, or other constriction on inside should not be used; (3) unions and all other fittings entering into riser should be of full-size opening; etc.

STEAM POWER PLANTS

Maximum-Pressure. Progress in Steam Power Plants by Using Maximum Pressure Steam (Fortschritte in Dampfkraftmaschinenbau durch Verwendung von Höchstdruckdampf), O. H. Hartmann. Glueckauf, vol. 59, nos. 8 and 9, Feb. 24 and Mar. 3, 1923, pp. 181-190 and 209-215, 24 figs. Describes experiments of Schmidt with boiler of 60 atmos. pressure, also tests with low- and high-speed piston engines, design of maximum-pressure-contra-pressure machines and constructional advantages of maximum-pressure-contra-pressure turbines. Concludes that misgivings hitherto entertained against high-pressure steam should be considered dispelled.

STEAM TURBINES

Condensation. Design and Construction of the G. M. A. Steam Turbine (Der konstruktive Aufbau der G. M. A.-Dampfturbine). Praktische Maschinen-Konstrukteur, vol. 56, nos. 4, 5 and 6, Jan. 26, Feb. 2 and 9, 1923, pp. 35-39, 45-49 and 57-58, 20 figs. Construction and operation of condensation turbine coupled to polyphase generator of 4000 kw.; describes two-pressure type of normal condensation turbine; counter-pressure turbines, i.e., high-pressure turbines, whole waste steam of which is used for heating plants.

De Laval. Self-centering of De Laval Turbines (De que depende el autocentraje del eje de la turbina de laval), Ramón G. Loyarte. Universidad Nacional de La Plata—Contribucion al Estudio de las Ciencias Fisicas y Matemáticas, vol. 3, no. 53, June 1922, pp. 91-103, 6 figs. Velocity of rotation and stable equilibrium; formulas and calculations.

Machining Blades. Machining Blades for Steam Turbines, Fred H. Colvin. Am. Mach., vol. 58, no. 15, Apr. 12, 1923, pp. 547-549, 10 figs. Important operations handled by both internal and external grinding; drilling and milling operations; how blades are assembled.

Marine. See MARINE STEAM TURBINES.

Mixed-Flow and Bleeder. Heat Balance Obtained by Special Turbine. Power Plant Eng., vol. 27, no. 8, Apr. 15, 1923, pp. 411-412, 3 figs. Combined mixed-flow and bleeder-type unit furnishes power and steam at reduced pressure to textile mill at Norwich, Conn.

Regenerators and Condensers. Steam Turbine Regenerators and Condensers, Terrell Croft. Nat. Engr., vol. 27, no. 4, Apr. 1923, pp. 148-152, 10 figs. Reasons for use of regenerator and adjustment to service requirements; computing size of condenser for steam-turbine service.

STEEL

Basic Bessemer. Correlation between the Physical and Chemical Properties of Basic Bessemer Steel. Iron & Coal Trades Rev., vol. 106, no. 2873, Mar. 23, 1923, p. 416. Writer points out that behavior of metal does not always depend entirely on its chemical composition, but also, and perhaps to greater extent, on its sensible heat. Review of paper by Otto Holz read before Assn. German Ironmasters.

Secondary Structures. Secondary Structures in Steel, N. T. Belaiew. Chem. & Met. Eng., vol. 28, no. 12, Mar. 21, 1923, pp. 537-540, 5 figs. Author believes that by suitably altering velocity of cooling through granulation zone and zone of secondary crystallization any one of three types of structures can be produced; this shows that type of structure depends in first instance not on chemical composition, but on conditions of cooling.

Stainless. Stainless Steel—Its Properties and Some of its Engineering Applications, J. H. G. Monypenny. Iron & Coal Trades Rev., vol. 106, no. 2871, Mar. 9, 1923, pp. 342-343. Corrosion differences, effects of heat treatment; air-hardening properties; resistance to corrosion; mechanical properties and composition; applications. (Abstract.) Paper read before Cleveland Instn. Engrs.

STEEL CASTINGS

Heat Treatment. Heat Treatment of Steel Castings, H. C. Ihsen. Forging & Heat Treating, vol. 9, no. 3, Mar. 1923, pp. 138-142, 17 figs. Steel castings, their characteristics in raw and thermally treated condition; consideration of correct treatment with relation to size and composition of casting.

STEEL, HEAT TREATMENT OF

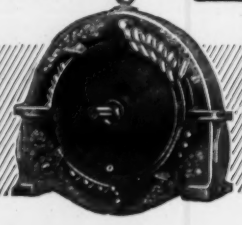
Molten Salts in. The Use of Molten Salts in Heat Treating, Wm. J. Merten. Forging & Heat Treat-

NO REPAIRS

"PERFECTLY satisfactory and no repairs." This is the statement from the engineer in charge of the Terry Turbines, installed at the Lever Bros. Co., Cambridge, Mass. This is not typical of all Terry turbine installations, for it must be recalled that Terry turbines were being manufactured over twenty years ago. There is no moving mechanism built, which will run forever with out replacing the wearing parts, and the Terry turbine is no exception to this rule. For this very reason The Terry Steam Turbine Company maintains a very complete and extensive stock of repair parts ready for immediate shipment and a force of trained men in the field for the purpose of making replacements when necessary. The fact that Lever Bros. have as yet made no repairs is significant of the fact that Terry turbines with the proper attention to lubrication and adjustment are free from operating kinks and troubles and will continue to give good service during the calculated life of their wearing parts.

Write for Bulletin No. 25-A, which contains a complete detail of these working parts and loads and stresses imposed upon them. You will then appreciate how small your replacement charges will be, should you select

THE TERRY TURBINE



Offices in Principal Cities in U.S.A. also in Important Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford. Conn. U.S.A.

ing; vol. 9, no. 3, Mar. 1923, pp. 148–150, 8 figs. Importance of heating finished steel parts protected from oxidizing gases; selection of proper salts to eliminate pitting and decarbonization; freedom of bath from impurities essential.

Quenching. On the Cause of Quenching Cracks. Kotaro Honda, Tokujiro Matsushita and Sakae Idei. Am. Soc. Steel Treating—Trans., vol. 3, no. 7, Apr. 1923, pp. 729–739, 9 figs. Account and results of investigation.

Tempering. Tempering of Steel and Alloys (La trempe de l'acier et des alliages métalliques). Albert Portevin. Génie Civil, vol. 82, no. 7, Feb. 17, 1923, pp. 151–154, 4 figs. Character and classification of changes due to heat treatment generally; physico-chemical and structural changes.

STEEL, HIGH-SPEED

Hardening. Difficulties in Hardening High-Speed Steel. O. G. Simmons. Machy. (N. Y.), vol. 29, no. 8, Apr. 1923, pp. 627–628, 2 figs. Experiments show that mere heating of some steels to certain temperatures, and cooling, will not harden them; some will remain soft when heated to so-called hardening temperature in presence of carbon-monoxide gas and cooled in oil.

Lathe Break-Down Tests. Lathe Breakdown Tests of Some Modern High-Speed Tool Steels. H. J. French and Jerome Strauss. U. S. Bur. of Standards—Technologic Paper, vol. 17, no. 228, Feb. 17, 1923, pp. 183–225, 17 figs. Data based on analysis of 65 lots, representing 40 brands, produced by various manufacturers during 1919–1922; comparative lathe cutting tests for various-type compositions; discusses limitation of competitive breakdown test, and recommendations regarding its applications.

STEEL MANUFACTURE

Casting Steel. A Great Forward Step in the Manufacture of Steel for Castings. L. W. Spring. Raw Material, vol. 6, no. 4, Apr. 1923, pp. 155–157, 2 figs. Methods and precautions used by Crane Co., Chicago to insure highest possible quality.

Top Discard. Top Discard in Its Relation to Quality. A. E. White. Am. Soc. Steel Treating—Trans., vol. 3, no. 7, Apr. 1923, pp. 750–757. Author makes appeal to steel mills to increase their tonnage output by adopting methods and devices for reducing amount of piping and segregation, thereby increasing their total yield per ton of metal cast into ingot molds.

STOKERS

Gas Works. Mechanical Stokers for Gas Works. Hartland Seymour. Gas Engr., vol. 39, no. 562, Feb. 1923, pp. 37–39, 4 figs. Savings which may be expected from mechanical stoking; discusses several types.

STREET RAILWAYS

Cars. Light Electric Cars of the Paris Company (La motrice électrique légère de la "Société des Transports en Commun de la Région Parisienne"). F. Laurent. Technique Moderne, vol. 15, no. 6, Mar. 15, 1923, pp. 176–180, 6 figs. Details of design and operation of standardized cars of Société des Transports into which all street-car companies have been merged.

New Safety Devices Developed in Tri-Cities. Elec. Ry. J., vol. 61, no. 9, Mar. 3, 1923, pp. 369–371, 7 figs. Scheme of control operates electrically instead of by air valves; devices claimed to be simple and comparatively inexpensive in first cost and maintenance.

SUPERHEATED STEAM

Advantages. Advantages of Superheated Steam. R. C. Demary. Nat. Engr., vol. 27, no. 4, Apr. 1923, pp. 155–157, 4 figs. Elimination of steam-line condensation; power demands at reduced pressures. Types of superheaters and installations.

T

TEMPERATURE MEASUREMENT

Methods. The Measurement of Heat. James Mackay. Domestic Eng. (Chicago), vol. 102, no. 11, Mar. 17, 1923, pp. 514–517, 1 fig. Detailed explanation of how temperature is measured in degrees fahrenheit and centigrade, with conversion chart. Notes on calorimeter, thermometer, specific heat of water, radiation, convection and conduction.

TERMINALS, RAILWAY

Freight. Freight Terminal Improvement at Denison, Texas. M. K. & T. Railway. Ry. Rev., vol. 72, no. 10, Mar. 10, 1923, pp. 393–400, 9 figs. Extensive double-hump yard layout, involving minor revision of line and complete new car and locomotive facilities.

Indianapolis, Ind. Construction of Union Passenger Station at Indianapolis. Ry. Rev., vol. 72, no. 14, Apr. 7, 1923, pp. 605–615, 18 figs. Description of station facilities and track elevation of Union Tracks division of Indianapolis Union Ry.

TESTING MACHINES

Load-Measurement Apparatus. Load Measurement and Checking with High Accuracy. J. S. Primrose. Metal Industry (Lond.), vol. 22, no. 10, Mar. 9, 1923, pp. 217–219, 4 figs. Various methods for checking and standardizing load-measurement apparatus such as used on testing machines.

TEXTILE MILLS

Heat Conservation. Heat Conservation in the Textile Industry (Wärmewirtschaft in der Textilindustrie). Chr. Eberle. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 11, Mar. 17, 1923, pp. 256–261, 5 figs. Principal desiderata for erection of heating and power plants in textile factories; utilization of engine or turbine steam for room heating and manufacturing purposes; heat utilization in drying apparatus; test results from cloth-drying machines.

Safety Devices in. Safety Devices in the Textile Industry. Boyd Fisher. Safety Eng., vol. 45, no. 1, Jan. 1923, pp. 12–13 and 27–29, 1 fig. Analysis of accidents in cotton and woolen mills shows that most of them do not occur on machinery.

THERMODYNAMICS

Laws. Recent Attacks on the Second and Third Thermodynamic Laws (Neuzeitliche Angriffe gegen den 2. sowie 3. Wärmesatz und deren Berechtigung). Schmolke. Wärme, vol. 46, no. 1, Jan. 5, 1923, pp. 1–5, 4 figs. Shows that these attacks are untenable.

TIDAL POWER

Utilization. Tidal Power on the Patagonian Coast (Estudio y utilizacion de las mareas de la costa patagonica). Horacio Damianovich and Nicolas Besio Moreno. Ingenieria, vol. 27, no. 2, Feb. 1923, pp. 62–68. Discusses different forms of tidal power utilization and proposes appointment of commission to study Patagonian problem.

TIRES, RUBBER

Large-Section. Far-Reaching Effects Are Predicted for Large Section Tires. Herbert Chase. Automotive Industries, vol. 48, no. 15, Apr. 12, 1923, pp. 812–814. Chief advantages are said to be easier riding quality which is given car, freedom from skidding, increased traction and lower unsprung weight; may involve chassis changes.

TOLERANCES

Standardization. Standardization of Tap Thread Tolerances. Machy. (N. Y.), vol. 29, no. 8, Apr. 1923, pp. 607–608. What has been accomplished toward standardization by cooperation among manufacturers in tap industry.

TOOLS

High- and Low-Grade Steel. Investigation of Relative Economy of Tools of High-Grade Steel and Tools of Low-Grade Material with Welded-On Edges, Particularly Lathe and Planing Tools (Vergleichsuntersuchungen zwischen Werkzeugen aus vollem, hochwertigem Stahl und solchen aus S. M.-Stahl mit aufgeschweisster Schneide, insbesondere der Dreh- und Hobelstähle). H. Eberts. Maschinenbau, vol. 2, no. 10, Feb. 21, 1923, pp. 589–593, 6 figs.

Standardization. Standardization in the Industries. Carl J. Oxford. Machy. (N. Y.), vol. 29, no. 8, Apr. 1923, pp. 611–612, 1 fig. Various aspects of standardizing mechanical products, with particular reference to small tools.

TRACTORS

Caterpillar. Caterpillar Tractors in Forestry Work (Forstwirtschaft und Raupenschlepper). G. Mayer. Motorwagen, vol. 26, no. 5, Feb. 20, 1923, pp. 65–67, 2 figs. Describes special type of tractor and its use for removal of lumber and planting of trees.

Fowler. Cross-Country Transport. Indian Industries & Power, vol. 20, no. 5, Jan. 1923, pp. 175–179, 4 figs. Limitation of present transport methods; the conventional caterpillar vehicle; common faults of conventional type of track and methods by which they are overcome in Fowler roadless tractor; other details of Fowler tractor; steering.

Types. Track-Laying Transport. Motor Transport (Lond.), vol. 35, nos. 929 and 930, Dec. 18 and 25, 1922, pp. 777–781 and 821–824, 18 figs. Evolution of this system of carriage that will greatly influence development of new countries.

TUBES

Forging. Forging Steel Tubing Instead of Drawing It. Chester Warner. Raw Material, vol. 6, no. 3, Mar. 1923, pp. 90–91, 5 figs. How problem of successfully forging tubing instead of drawing it was solved; process invented by author and E. Warner; economic advantages.

TURBO-COMPRESSORS

Impellers. Calculation of Impellers (Sur le calcul des roues centrifuges). Alfred Carrard. Technique Moderne, vol. 15, nos. 3 and 4, Feb. 1 and 15, 1923, pp. 65–71 and 100–104, 35 figs. Formulas and calculations for impellors for turbo-pumps and turbo-compressors. Describes trials to test calculations. Bibliography.

TYPEWRITERS

Manufacture. The Manufacture of the Barlock Typewriter. Engineering, vol. 115, no. 2987, Mar. 30, 1923, pp. 392–393, 10 figs, partly on p. 400. Manufacturing methods employed at new works at Nottingham, England.

V

VENTILATION

Prisons. Ventilating Problems in Prison Work. Heating & Vent. Mag., vol. 20, no. 3, Mar. 1923, pp. 37–40, 7 figs. Features of mechanical equipment for north wing of Washington State Reformatory, Monroe, Wash.

VIBRATIONS

Machinery. Insulation of Machine Vibrations and Noises (Isolierung von Maschinen-Erschütterungen und Geräuschen). Walter Ritter. Praktische Maschinen-Konstrukteur, vol. 56, no. 3, Jan. 19, 1923, pp. 25–27. Ways of eliminating vibration and results of tests with insulating materials.

Machinery Foundations. Vibrations in Foundations. Ernst Schmidt. Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 248–250, 11 figs. Method of investigation based on use of vectors. Effect of elastic intermediary layer between machine and foundation. Translated from Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 2, Jan. 13, 1923, p. 33.

VISCOSIMETERS

MacMichael. The Improved MacMichael Viscosimeter. Winslow H. Herschel. Optical Soc. of Am.—J., vol. 7, no. 4, Apr. 1923, pp. 335–353, 6 figs. Described viscosimeter is a constant-deflection torsional instrument; discusses sources of error; measurement of moments; experimental results with dial readings.

W

WAGES

Piece-Rate Methods. Piece-Work System in Car Maintenance. Elec. Ry. J., vol. 61, no. 11, Mar. 17, 1923, pp. 443–446, 9 figs. I. R. T. Co. in New York City has secured excellent results from its use on routine jobs; men make more and company saves money.

WASTE HEAT

Utilization. The Utilization of Waste Heat from Gas-Works Furnaces (Die Verwertung der Abhitze der Gaswerksöfen). L. Litnsky. Feuerungstechnik, vol. 11, no. 11, Mar. 1, 1923, pp. 121–124, 4 figs. Utilizable heat sources of gas-works furnaces, excess heat in flue gases; steam consumption of gas works; steam volumes available from flue gases; draft conditions; waste-heat boilers; arrangement and economy of waste-heat installations.

WATER ELEVATORS

Bolton. The "Bolton" Water Elevator. Ry. Gaz., vol. 38, no. 13, Mar. 30, 1923, p. 519, 2 figs. Elevator raises water by means of endless band, and can be run at high speed.

WATER PIPES

Friction Heads. Formulas for Calculating Friction Heads in Water Pipes. F. E. Giesecke. Heating & Vent. Mag., vol. 20, no. 3, Mar. 1923, pp. 33–36, 4 figs. What is wrong with those commonly used and how they should be modified to fit actual conditions.

WATER POWER

France. Water Power in Central France (La Houille Blanche dans le Massif Central Français). Raoul Blanchard. Houille Blanche, vol. 21, no. 71–72, Nov.-Dec. 1922 and vol. 22, no. 73–74, Jan.-Feb. 1923, pp. 204–206 and 9–19, 5 figs. Physical and hydrological conditions; drainage areas; rainfall; water-power resources; hydroelectric developments.

Italy. Water Resources and a Register of Artificial Lakes (Il problema delle riserve idrauliche e l'opera svolta dal Servizio Idrografico per la compilazione di un elenco generale dei laghi artificiali). Luigi Cozza. Giornale del Genio Civile, vol. 60, Nov. 30, 1922, pp. 721–741. Report to Minister of Public Works giving reservoirs in existence and under construction, and details of Italian developed and undeveloped water resources.

WEIGHTS AND MEASURES

Converting Millimeters to Inches. A Useful Conversion Chart. Eng. Production, vol. 6, no. 127, Apr. 1923, p. 234, 1 fig. Graphic method of ascertaining English and metric equivalents.

WELDING

Aluminum Automotive Parts. Welding Aluminum in Automot ve Parts Manufacture. Horace C. Knerr. Automotive Industries, vol. 48, no. 13, Mar. 29, 1923, pp. 726–731, 14 figs. It is claimed that dependable joints are secured only by this method; aluminum sheet less subject to corrosion and lighter than terneplate.

[See also ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE; OXY-ACETYLENE WELDING.]

WELDS

Compressed-Air Tank. Explosion of Compressed-Air Tank With Autogenous Welds (Explosion d'un réservoir à air comprimé soudé à l'autogène). V. Kammerer. Associations Françaises de Propriétaires d'Appareils à Vapeur—Bul., vol. 4, no. 11, Jan. 1923, pp. 39–44, 5 figs. One of group of three exploded; examination showed that certain welds of good appearance and having passed hydraulic test, may be very poor and insecure.

WIND MOTORS

Types. Power from the Wind. J. H. Crabtree. Power Engr., vol. 18, no. 203, Feb. 1923, pp. 59–61, 5 figs. Main types of British windmills and outstanding features of their operation.

WIRE ROPE

Steel. Some Recent Developments in Steel-Wire Ropes. T. Albert Taylor. Iron & Coal Trades Rev., vol. 106, no. 2872, Mar. 16, 1923, pp. 378–379, 6 figs. Also Colliery Guardian, vol. 125, no. 3246, Mar. 16, 1923, pp. 637–638, 5 figs. Deals with locked-coil type; compound triangular flattened-strand rope; guide and balance ropes; haulage ropes; recapping and anchoring; practical suggestions. Paper read before Birmingham University Min. Soc.

Alphabetical List of Advertisers

See Pages 116-132 for Classified List of Mechanical Equipment

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THE ENGINEERING INDEX

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(See also page 456 of this issue for supplementary items.)

ABRASIVE WHEELS

Manufacture. Manufacturing Abrasive Wheels at Hamilton Plant. Can. Machy., vol. 29, no. 17, Apr. 26, 1923, pp. 17-19 and 26, 5 figs. Crushing ore and grading grains; removing magnetic material; mixing; preparing wheel for burning; truing and testing; method of grading.

ACCIDENT PREVENTION

Welding Apparatus, Compressed-Gas. Regulations for the Prevention of Accidents in Welding and Cutting Plants Using Compressed Gases (Unfallverhutungsvorschriften fur die mit verdichteten Gasen arbeitenden Schweiss- und Schneidanlagen). Autogene Metallbearbeitung, vol. 16, nos. 7 and 8, Apr. 1 and 15, 1923, pp. 83-84 and 96-98. Details of German regulations in force Jan. 1, 1923.

ACCIDENTS

Industrial. Industrial Accidents and Hygiene. Monthly Labor Rev., vol. 16, no. 2, Feb. 1923, pp. 220-231. Safety activities of U. S. Government. Coke-oven accidents in the United States during 1921. Coal-dust explosion tests. Gas masks and respirators for use in railroad tunnels. Metalliferous mine accidents in Colorado, 1920 and 1921. Effects of fatigue and temperature on causation of industrial accidents, Great Britain.

ACCOUNTING

Corporation. Future Company Accounting and Disbursement. Charles Hine. Ry. Age, vol. 74, no. 22, May 5, 1923, pp. 1103-1105, 1 fig. Criticisms of present methods and suggestions for simplification; pay-before-audit system.

Industrial. Organized Account Keeping in Industrial Plants (Exemple d'organisation de la comptabilite en vue de son utilisation pour le controle de la marche et la direction d'une entreprise industrielle). C. Barbet. Arts et Metiers, vol. 76, no. 28, Jan. 1923, pp. 408-416. Discusses complete scheme of accounts, payrolls, etc., as means of management of works.

AERONAUTICAL INSTRUMENTS

Measuring Instruments. Aeronautical Measuring Instruments (Messgerate der Luftfahrt). Zeit. fur Flugtechnik u. Motorluftschiffahrt, vol. 14, no. 3-4, Feb. 26, 1923. Contains following articles: Method of Measuring Speed Capacity of Airplanes, Heinrich Koppe, pp. 17-25, 5 figs.; Measuring Instruments and Mechanics, E. Everling, pp. 25-29. Bibliography of German Literature on Aeronautical Instruments, pp. 28-33. Review of books on aeronautical instruments, pp. 33-34.

Paris Show. Aeronautical Equipment at the 1922 Paris Exhibition (Apres le Salon de 1922—Les equipements et les amenagements de bord). A. Volmerange. Aeronautique, vol. 5, no. 45, Feb. 1923, pp. 62-69, 7 figs. Describes instruments and apparatus used in course of flight, including indicators and safety devices of various types.

Timing Devices. The Timing of Airplane Races. B. Russell Shaw. Aerial Age, vol. 16, no. 4, Apr. 1923, pp. 171-172, 3 figs. Describes electrical timing and recording device which, it is claimed, insures accuracy impossible by any of other methods generally adopted.

AERONAUTICS

Vorticism. Vorticism in Aeronautics, W. H. Sayers. Aeroplane, vol. 24, nos. 12, 13, 14, 15, 16 and 17, Mar. 21, 28, Apr. 4, 11, 18 and 25, 1923, pp. 211-212 and 214, 231-232 and 234, 253-254 and 256, 271-272, 287-288 and 307-310, 28 figs. Recent progress in theory of aerodynamics, particularly as regards aerofoil. Mar. 21: Practical value of theory of aerofoil, influence on design and research. Mar. 28: Mechanism by which it is assumed that lift must be produced; nature of flow around aerofoil and formation of vortices behind it. Apr. 4: Application of theory to wing of infinite and finite span. Apr. 11: Practical methods of applying theory to calculate effect on monoplane of changes of aspect of ratio. Apr. 18: Application of theory to case of biplane wings. Apr. 25: Review of objections raised in England.

AIR COMPRESSORS

Portable. A Self-contained Portable Air Compressor. Engineer, vol. 135, no. 3511, Apr. 13, 1923, p. 399, 2 figs. New type for use especially for steel construction, road-breaking and contractors' work generally.

Turbo-Compressors. Calculation of Turbo-Compressors (Calcul des turbo-compresseurs). G. Rollet. Arts et Metiers, vol. 75, no. 27, Dec. 1922 and vol. 76, no. 28, Jan. 1923, pp. 375-387 and 428-438, 7 figs. Isothermic, adiabatic and polytropic compression; cooling systems; heating of gas in centrifugal compressors; calculations; application to air turbo-compressors for mines.

AIRCRAFT

Model. Model Aircraft, R. A. Fraser. Roy Aeronautical Soc.—Jl., vol. 27, no. 147, Mar. 1923, pp. 105-113, 8 figs. Notes on types of aircraft; how wind forces are measured; flow patterns. Juvenile lecture.

Post-War Development. Aircraft Development Since the Armistice. Air Service Information Circular, vol. 5, no. 402, Jan. 15, 1923, 34 pp., 7 figs. Part I: Airplanes. Part II: Armament. Part III: Engines. Part IV: Equipment.

AIRCRAFT CONSTRUCTION MATERIALS

Fabrics, Wing. Experiments with Fabrics for Covering Airplane Wings, A. Proll. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 137, Apr. 1923, 37 pp., 33 figs. Deals with strength and deformation of fabric itself, both undoped and doped; it was shown that Cellon exercises predominant influence on results, according to nature and number of coats. Translated from Technische Berichte, vol. 3, no. 3, 1918.

AIRPLANE ENGINES

Fins, Heat Conduction in. Mathematical Equations for Heat Conduction in the Fins of Air-Cooled Engines, D. R. Harper, 3d and W. B. Brown. Nat. Advisory Committee for Aeronautics—Report, no. 158, 1923, 32 pp., 12 figs. Results of laboratory investigations.

Lawrance, Machining. Making the Lawrance Airplane Engine. Fred H. Colvin. Am. Mach., vol. 58, no. 18, May 3, 1923, pp. 649-652, 13 figs. Methods of machining aluminum air-cooled cylinders; master connecting rod with eight smaller rods; single-throw crankshaft.

Motorcycle Engines as. Cycle Engines for Light Planes. Flight, vol. 15, nos. 17 and 18, Apr. 26 and May 3, 1923, pp. 228, 2 figs. and 240-241, 3 figs. Apr. 26: The Coventry Victor 688-cc. flat twin engine. May 3: The Bradshaw 500-cc. oil-cooled engine.

Navy Developments. Recent Developments in Aircraft Engines in the Navy. Bruce C. Leighton. Aerial Age, vol. 16, no. 5, May 1923, pp. 220-226, 7 figs. Review of tests on different models; reduction in weights; air-cooled vs. water-cooled engine; influence of power-plant weight on transportation costs.

Stability. On the Stability of Aero Engines, J. Morris. Roy. Aeronautical Soc.—Jl., vol. 27, no. 148, Apr. 1923, pp. 182-217, 14 figs. Treatment of problem which, in author's belief, is entirely original and involves only elementary knowledge of algebra.

Starting Systems. Starting Systems for Large Aircraft Engines, A. C. Burgoine. Automobile Engr., vol. 13, no. 175, Apr. 1923, pp. 114-117, 10 figs. Consideration from two standpoints: ground starter for use with lighter classes of machines, and permanently attached starter for larger and more powerful types.

AIRPLANE PROPELLERS

Calculation and Manufacture. Calculation and Construction of Wooden Propellers (Le calcul et la construction des helices en bois). Suffrin-Hebert. Technique Moderne, vol. 15, no. 8, Apr. 15, 1923, pp. 232-236, 10 figs. Characteristics of propellers; calculation of resistance; raw materials; processes of manufacture.

Wooden. The Manufacture of Airplane Propellers (La fabrication des helices d'aviation). M. Suffrin-Hebert. Ouvrier Moderne, vol. 6, no. 1, Apr. 1923, pp. 1-5, 8 figs. Processes in manufacture of wooden propellers.

AIRPLANES

Factors, Analysis of. Analysis of Airplane Factors, A. F. Zahm. Franklin Inst—Jl., vol. 195, no. 3, Mar. 1923, pp. 289-302, 9 figs. Factors occasionally used in forecasting and comparing performance of airplane are derived and graphically illustrated.

Flying Boats. See FLYING BOATS.

Gliders. See FLIGHT, Gliders, Starting.

Lacierva Autogiro. New Type of Flying Machine—The Lacierva "Autogiro." Heraclio Alfaro. Aviation, vol. 14, no. 15, Apr. 9, 1923, pp. 397-398, 2 figs. Most interesting feature of Spanish gyroplane is said to be its ability to land with practically no forward speed, engine being shut off; experiments showed that it has remarkable stability; consists of big wind vane mounted in ball bearings on ordinary tractor airplane with 80-hp. Le Rhone engine and tractor propeller; see also (editorial) p. 393.

Military. The Dornier-Falke Metal Pursuit Monoplane (Der Metall-Jagdeindecker, Type "Dornier-Falke"). H. Werner. Motorwagen, vol. 26, no. 7, Mar. 10, 1923, pp. 102-104, 10 figs. Characteristics: Span, 10 m.; surface depth, 2 m.; overall length, 7.4 m.; max. height, 2.66 m.; load, 350 kg., max. speed, 260 km. per hr.

Oscillation, Longitudinal. Complete Study of the Longitudinal Oscillation of a VE-7 Airplane. F. H. Norton and W. G. Brown. Nat. Advisory Committee for Aeronautics—Report, no. 162, 1923, 5 pp., 4 figs. Investigation to study behavior of airplane when making longitudinal oscillation; air speed, altitude, angle with horizon and angle of attack were all recorded simultaneously and resulting curves plotted to same time scale.

Ribs. Influence of Ribs on Strength of Spars, L. Ballenstedt. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 139, May 1923, 18 pp., 12 figs., 2 tables. It is pointed out that assumption that

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
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Materials (Matls.)
Mechanical (Mech.)
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Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 140

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Machy. Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Elec & Mfg. Co.
Weston Electrical Instrument Co.

Anchorages, Overhead Transmission
Midwest Steel & Supply Co.

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Babbit Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdy. & Mach. Co.
* Timken Roller Bearing Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Machy. Co.

Blocks, Tackle
Clyde Iron Works Sales Co
* Roebling's, J. A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Baffles
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Boiler Compounds
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Connelly, D. Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co
* Wickes Boiler Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brick, Fire
* Bernitz Furnace Appliance Co
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.
Link-Belt Co.

Bridgewalls (Furnace)
McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Cars, Charging
Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co
Hyro Mfg. Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

ribs are connected to spars by flexible joints is not accurate, as they are attached very firmly to spars by means of brackets, nails and glue; investigation to determine what effect this type of joint has on strength of spars.

Supercharging. The Greatest Possible Speeds in Aviation (Les plus grandes vitesses possibles en aviation), M. Rateau. Annales des Postes, Télégraphes et Téléphonés, vol. 11, no. 5, Sept.-Oct. 1922, pp. 920-958, 8 figs. Shows that speed of 400 km p.h. can be surpassed if one flies at high altitudes and maintains engine power by super-compression or supercharging; discusses application of turbo-compressors and describes several types; pressures and specific weights of air at normal atmosphere.

Wings. Aerodynamic Qualities and Sustaining Wing Construction (Qualitées aérodynamiques et construction des ailes sustentatrices), R. Pris. Aéronautique, vol. 5, no. 47, Apr. 1923, pp. 163-170, 11 figs. Monoplanes with central fuselage; wings of variable thickness and camber; disposition of materials; wings of constant thickness and variable camber.

Wright Pursuit. Points of Particular Interest in the Wright All-Metal Pursuit Plane. Aerial Age, vol. 16, no. 5, May 1923, pp. 215-217, 2 figs. Characteristics: overall length, 28 ft.; wing area, 200 sq. ft.; power plant, Wright H-3 400-hp. engine; air speed, 160 mi. per hr.; armament, 2 machine guns; weight empty, 1819 lb.

AIRSHIPS

Non-Dimensional Characteristics. Non-Dimensional Coefficients for Comparison of Airship Characteristics, P. Jaray. Aviation, vol. 14, no. 12, Mar. 19, 1923, pp. 314-315 and (discussion) 315-317, 3 figs. Value of non-dimensional characteristics; coefficients for comparison of propulsive, lift, and general efficiency. Includes tabular comparison of world's airships. Discussion by R. H. Upson and author's reply.

Rigid, Stresses in. General Theory of Stresses in Rigid Airship, ZR-1, W. Watters Pagon. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 140, May 1923, 43 pp., 13 figs. Deals with primary and secondary stresses, and with effect of keel girder.

Types. Airships, F. Arnold Best. Instn. Mech. Engrs.—Proc., no. 1, Jan. 1923, pp. 47-53. Brief reference to gases used in airship work and their behavior when submitted to difference of atmospheric pressure and temperature, followed by discussion of mechanical and constructional details of various types of airships.

ALLOY STEELS

Figuring Proportions. Short Method for Figuring Alloys, J. M. Quinn. Blast Furnace & Steel Plant, vol. 11, no. 5, May 1923, pp. 279-282. Comprehensive system of tables and proportions used by practical steel makers.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Bearing Metals. See BEARING METALS.

Brass. See BRASS.

Bronze. See BRONZE.

Copper. See COPPER ALLOYS.

Heat Treatment. Heat Treatment of Alloys (Sur la definition et les conditions de traitement thermique des alliages), L. Grenet. Technique Moderne, vol. 15, nos. 5 and 7, Mar. 1 and April 1, 1923, pp. 135-141 and 203-209, 14 figs. Definition of alloys from standpoint of their application; constitution of alloys; unstable phases; effect of velocity of cooling; stabilizing treatments; etc.

Iron. See IRON ALLOYS.

Magnesium. See MAGNESIUM ALLOYS.

Properties. Effect of Structure on Elastic and Mechanical Properties of Mixtures (Considérations relatives à l'influence de la structure sur les propriétés élastiques et mécaniques d'un mélange), Albert Portevin. Revue de Metallurgie, vol. 20, no. 1, Jan. 1923, pp. 49-62, 23 figs. Expansion, electric resistance and other properties of alloys.

ALUMINUM ALLOYS

Aluminum-Silicon. Some New and Important Alloys of Aluminium, T. B. L. Cain. Metal Industry (Lond.), vol. 22, no. 17, Apr. 27, 1923, pp. 413-414. Review of work done in development, founding, and field of use of aluminum-silicon alloys.

Castings. Aluminum-Bronze Casting (Aluminiumbronzeguss), Harry Baclesse. Giesserei-Zeitung, vol. 20, no. 5, Feb. 1, 1923, pp. 58-60, 4 figs. Points out that, in molding of aluminum-bronze casting, consideration must be given in arrangement of gates and risers to injurious formation of scum. Horn- and spiral-shaped gates and higher risers are recommended, in order to counteract contraction.

Composition. Industrial Method of Proportioning Light Aluminum Alloys (Sur une méthode industrielle de dosage des alliages légers d'aluminium), Ph. Pascal. Chimie & Industrie, vol. 9, no. 2, Feb. 1923, pp. 264-269. Content of aluminum alloys; extra-light alloys, light alloys of medium resistance, and light alloys of high resistance.

Copper-Zinc-Aluminum. Physical and Metallographic Properties of Copper-Zinc-Aluminum Alloys Containing Small Amounts of Magnesium, F. H. Dix, Jr. and A. J. Lyon. Air Service Information Circular, vol. 4, no. 393, Feb. 15, 1923, 11 pp., 5 figs. Investigation to determine effect of replacing iron in aluminum alloy no. 3 by small amounts of magnesium; use of magnesium in place of iron was found to be inadvisable.

Properties and Uses. Aluminum and Aluminum Alloys (Aluminium und Aluminiumlegierungen), W. Siebers. Giesserei-Zeitung, vol. 20, nos. 8 and 9, Mar. 15 and Apr. 1, 1923, pp. 124-127 and 148-152, 1 fig. Physical and chemical properties of aluminum; melting and casting; method of melting aluminum filings; aluminum as refining medium. Light metals, their alloys and technical applications; aluminum bronzes; zinc-copper-aluminum alloys; duralumin and silumin.

AMMONIA

Thermodynamic Properties. Tables of Thermodynamic Properties of Ammonia. U. S. Bur. of Standards—Circular, no. 142, Apr. 16, 1923, 47 pp., 5 figs. Tables embody results of elaborate series of measurements and have been prepared in forms convenient for refrigerating engineering; same data are also presented graphically in form of Mollier chart.

ANNEALING

Study of Process. Contribution to the Study of the Annealing Process (Beitrag zur Kenntnis des Temperprozesses), P. Oberhoffer and J. Welter. Stahl u. Eisen, vol. 43, nos. 4 and 9, Jan. 25 and Mar. 1, 1923, pp. 105-110, and 301-306, 28 figs. Influence of composition, annealing temperature and medium on properties; behavior of sulphur; the soft skin.

APPRENTICES, TRAINING OF

Foundries. Apprentice Courses Are Successful. Herbert R. Simonds. Iron Trade Rev., vol. 72, no. 19, May 10, 1923, pp. 1377-1381, 5 figs. Courses of special training conducted by Reed-Prentice Co. at Worcester, Mass.

Patternmakers and Molders. The Training of Patternmaking and Molding Apprentices According to the Plan of Courses Worked out by the German Committee for Technical Education (Die Ausbildung der Modelltischler- und Formerlehrlinge nach den Lehrgängen des Deutschen Ausschusses für technisches Schulwesen), Chr. Gilles. Giesserei-Zeitung, vol. 20, no. 5, Feb. 1, 1923, pp. 51-57, 12 figs. Fundamental rules for training of apprentices; curriculum for school and workshop for each year of training.

ASH HANDLING

Conveyor for. New Type of Ash Conveyor. Paper, vol. 31, no. 26, Apr. 18, 1923, pp. 137-138, 3 figs. Construction and operation of Combusco water-seal ash conveyor; which offers method of handling ashes from boiler room which does away with gases, steam, dust, etc. and moves refuse mechanically to any desired point; manual labor almost entirely eliminated.

ATOMS

Atomic Projectiles. Atomic Projectiles and Their Properties, Ernest Rutherford. Engineering, vol. 115, nos. 2982, 2983, 2984, 2985 and 2986, Feb. 23, Mar. 2, 9, 16 and 23, 1923, pp. 242-243, 264-266, 306-308, 338-340 and 358-359, 29 figs. Review of five lectures delivered before Roy. Instn. Account of properties of swiftly moving electrons and atoms, and of effects produced by their passing through matter.

Structure. The Structure of the Atom, H. Stanley Allen. Chem. & Industry; vol. 42, no. 14, Apr. 6, 1923, pp. 338-342. Development of atomic theory; atomic theory of electricity; atomic and molecular numbers; arrangement of electrons in space; mechanics of atom; structure of nucleus.

AUTOMOBILE ENGINES

Carburetors. See CARBURETORS.

Cylinders. Machining a Cylinder Block Casting. Machy. (Lond.), vol. 21, no. 545, Mar. 8, 1923, pp. 705-709, 10 figs. Methods of Riley, Ltd., Coventry, including bore-rolling process and machine for cutting connecting-rod clearance.

Heavy-Oil. The Bagnolo Heavy-Oil Engine (Il motore Bagnolo veloce ad olio pesante), Emanuele Koch. Bollettino della Sezione di Roma dell' A. N. I. A. I., vol. 16, no. 10, Oct. 1922, pp. 131-133, 2 figs. Comparison of heavy-oil and gasoline engines; construction and operation of 30-hp. Bagnolo engine working on an explosive air mixture of 23:1; fuel consumption 240 grams per hp.

Ignition. See IGNITION.

Machining Operations. Main Bearing Bore Used as Locating Surface in Hinkley Crankcase. Automotive Industries, vol. 48, no. 16, Apr. 19, 1923, pp. 861-865, 15 figs. Several machining operations transferred to assembly department to assure correct alignment of pistons, cylinder flange and clutch; method is said to save cost of expensive fixtures.

Newcomb. Newcomb Engine Is Characterized by High Economy at Part Load, Herbert Chase. Automotive Industries, vol. 48, no. 19, May 10, 1923, pp. 1022-1025, 5 figs. Single-cylinder unit of constant compression, localized-charge type operates on 2-stroke cycle; chassis weighing 1300 lb. fitted with engine said to travel 65 to 80 mi. per gal.; head designed to prevent commingling of charge and spent gas.

Pistons. Manufacture of Pistons for Automobile Engines (Fabrication économique en série des pistons pour moteurs d'automobiles), Ouvrier Modernes, vol. 5, no. 12, Mar. 1923, pp. 498-502, 13 figs. Details of processes for quantity production.

Supercharging. Super-charging. Autocar, vol. 50, no. 1437, May 4, 1923, pp. 757-759, 5 figs. Development of supercharger as means of increasing efficiency of a given size of engine.

The Benefits of Super-Charging. Autocar, vol. 50, no. 1434, Apr. 13, 1923, 615-618, 7 figs. Principle of supercharging. Description of Mercedes supercharger as standardized on the 10-40-hp. touring chassis; details of new 10-40-hp. Mercedes chassis and test made.

AUTOMOBILE FUELS

Types. Congress and Exposition of Liquid Fuels—Oct. 4-15, 1922 (Le Congrès et l'Exposition des combustibles liquides), Ch. Berthelot. Revue de Metallurgie, vol. 20, nos. 2 and 3, Feb. and Mar. 1923, pp. 112-129 and 175, 1 fig. Discusses petroleum, shales, lignites, tar and benzols, alcohol, and vegetable oils, Diesel and semi-Diesel engines; use of heavy oils in Diesel engines.

Motor-Fuel Symposium. Indus. & Eng. Chem., vol. 15, no. 5, May 1923, pp. 476-488, 2 figs. Contains following articles: Fuel Requirements of Internal-Combustion Engines, Stanwood W. Sparrow; Economic Aspects of Motor-Fuel Supply from Petroleum, F. W. Lane and A. D. Bauer; Refinery Problems Affecting Motor-Fuel Supplied, F. A. Howard and N. E. Loomis; Alcohol as a Motor-Fuel Constituent, Henry A. Gardner; Coal Tar as a Source of Fuel for Internal-Combustion Engines, Wilbert J. Huff.

AUTOMOBILES

Air Resistance. Calculation of Efficiency of Automobiles (Leistungsberechnung von Motorfahrzeugen), Hans Keitel. Motorwagen, vol. 26, no. 7, Mar. 10, 1923, pp. 108-110, 3 figs. With special consideration of net weight and air resistance, based on results of experiments with new Keitel air-stream car.

Air-Resistance Investigations on Automobile Models (Luftwiderstands-Untersuchungen an Automobil-Modellen), W. Klemperer. Zeit. fur Flugtechnik u. Motorluftschiffahrt, vol. 13, no. 14, July 31, 1922, pp. 201-206, 14 figs. Based on ideas and designs developed by P. Jaray, series of systematic tests were carried out in large wind tunnel of Zeppelin works to determine what advantages could be gained by building automobile bodies along aerodynamically favorable lines; investigation of Jaray streamline cars and other models.

Albatros. The Albatros Car. Auto-Motor Jl., vol. 28, no. 17, Apr. 26, 1923, pp. 345-347, 9 figs. Details of light car of 10 hp., made in four models.

Astral. The 12-Hp. Astral. Autocar, vol. 50, no. 1435, Apr. 20, 1923, pp. 652-653, 7 figs. Details of chassis design. Four-cylinder engine; 3-speed and reverse gear box in unit with engine.

Bodies. De Luxe All-Weather Bodies. Autocar, vol. 50, no. 1430, Mar. 16, 1923, pp. 428-430, 4 figs. Points of design and construction needing careful attention before this type is worthy of highest-grade chassis.

Eliminating Weight. Autocar, vol. 50, no. 1431, Mar. 23, 1923, pp. 480-482, 4 figs. Details of Weymann coachwork system in which lightness, durability, cheapness and silence are prominent features.

French Makers Are Experimenting with Fabric Covered Bodies, W. F. Bradley. Automotive Industries, vol. 48, no. 14, Apr. 5, 1923, pp. 765-767, 7 figs. Weymann Body Co., Paris, are producing patented type of wood and fabric sedan of exceptionally light construction; bodies of this type are also being produced by Talbot-Darracq and Citroen.

Brakes, Four-Wheel. Four-Wheel Brakes Extensively Used in France, Italy and Belgium, W. F. Bradley. Automotive Industries, vol. 48, no. 12, Mar. 22, 1923, pp. 658-665, 27 figs. Sixty-seven manufacturers employ them on one or more models of passenger-car chassis; adopted on cars of nominally 10 hp.; describes braking mechanism of various cars.

Brennabor. The New 6-20 Horsepower Brennabor Automobile (Der neue 6-20 PS Brennabor-Motorwagen und seine Herstellung). Wirtschaftsmotor, vol. 5, no. 2, Feb. 1923, pp. 7-10, 5 figs. Four-stroke four-cylinder engine; details of design and operation.

Delage. The 12.8 Hp. Delage. Auto-Motor Jl., vol. 28, no. 15, Apr. 12, 1923, pp. 305-308, 10 figs. French vehicle employing monobloc 4-cylinder one-unit engine; four-wheel braking.

Differentials. New Differential Prevents Stalling When One Wheel Turns Free. Automotive Industries, vol. 48, no. 18, May 3, 1923, pp. 979-980, 6 figs. A gearless, self-locking type, involving no changing in method of operation, developed by C. Andrade, Jr.; vehicle equipped with it can be run even though one live axle is broken; decreases tire wear.

German. German Priamus Chassis Replete with Novel Features, Benno R. Dierfield. Automotive Industries, vol. 48, no. 13, Mar. 29, 1923, pp. 719-723, 7 figs. Front axle has live spindles and knuckle pivot in central plane of wheel; steering-gear crank is mounted in bracket separate from housing with connecting rod attached to nut; roller bearings extensively used; springs have no shackles.

Noise-Testing Device. The Evaluation of Noise. Automobile Engr., vol. 13, no. 75, Apr. 1923, pp. 109-112, 7 figs. Describes sound-testing device for comparing and expressing sound in unit terms; consists of sonometer mounted on tripod, to which is fitted standard G-type set of bin-aural instruments.

North-Lucas. The North-Lucas Light Car. Automobile Engr., vol. 13, no. 75, Apr. 1923, pp. 98-104, 10 figs. Weighs only 1700 lb. complete for road; chief features are use of streamlined body shell as main frame of car, independent springing of each wheel on coil springs with hydraulic dampers, and location at rear of 5-cylinder radial air-cooled engine, with crankshaft arranged vertically.

Producer-Gas Application. Gas Producers and Their Application to Industrial Automobiles (Les Gazogènes et leur application aux vehicules automobiles industriels), Maurice Dubois. Industrie des Tramways Chemins de Fer et Transports Public Automobiles, vol. 17, no. 195, Mar. 1923, pp. 80-83. Present state of application of producer gas to automobiles; notes on gas producers used for automobiles; details of tests carried out.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 140

Castings, Acid Resistant
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co

Castings, Brass
Du Pont Engineering Co.
* Edward Valve & Mfg. Co.

Castings, Die-Molded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Heavy
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
* Cole, R. D. Mfg. Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Royersford Fdry. & Mch. Co.
* U. S. Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)
* Edward Valve & Mfg. Co.

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Vogt, Henry Machine Co.

Castings, Steel
* Falk Corporation
Link-Belt Co.
Mackintosh-Hemphill Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Div.)

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Iron and Steel
Smooth-On Mfg. Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cement, Pipe Joint
Smooth-On Mfg. Co.

Cement, Water-Resistant
Smooth-On Mfg. Co.

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
Chain Belt Co.
* Diamond Chain & Mfg. Co
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corp'n

Charging Machines
Whiting Corp'n

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Cloth, Rubber
* Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works
Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Elect. Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring (Metal)
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
Novo Engine Co.
* Titusville Iron Works Co.
Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* U. S. Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.
* Simplex Valve & Meter Co.

Converters, Steel
Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
* Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.
Link-Belt Co.

Conveyors, Ice
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Coupling, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falk Corporation
* Fawcus Machine Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
* Medart Co.
* Nordberg Mfg. Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Locomotive
* Brown Hoisting Machinery Co.
Link-Belt Co.
Whiting Corp'n

Cranes, Locomotive (Crawler)
Link-Belt Co.

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

S.L.I.M. The S.L.I.M. Car. Auto-Motor Jl., vol. 28, no. 15, Apr. 12, 1923, pp. 325–328, 10 figs. Built by Société Lyonnaise d'Industrie Méchanique, Lyon; Monobloc 4-cylinder engine comprising leather-faced cone clutch; four-wheel brakes and four valves per cylinder; back-axle deadweight eliminated.

Suspension. Principles of Vehicles Suspension. H. S. Rowell. Automobile Engr., vol. 13, no. 175, Apr. 1923, pp. 118–122, 11 figs. Consideration of problem from standpoint of comfort; dynamics of single body — the block cart; simple sprung system of two masses — the spring cart; doubly-sprung wagon — Victorian brougham and railway car; systems in one line. (Abstract.)

Taxicabs Taxicab Body Construction. Hugh G. Bersie. Soc. Automotive Engrs. Jl., vol. 12, no. 5, May 1923, pp. 480–483, 7 figs. Differences in body requirements for taxicabs as compared with passenger cars; methods used to secure durability to discount severe service to which body is subjected; woods suitable for body framework; desirable types of roof and factors influencing design; summary of present conditions. Bibliography.

Torque Systems. Special Torque Systems. Autocar, vol. 50, no. 1435, Apr. 20, 1923, pp. 640–641, 8 figs. Selection of methods adopted to take torque reaction when engine and gear box are in one unit.

Tractor-Automobile. The Citroen-Kegresse Tractor-Automobile (Le propulseur Kégresse à bande souple). G. Delanghe. Génie Civil, vol. 82, no. 13, Mar. 31, 1923, pp. 293–300, 12 figs. The two pairs of rear wheels are developed tractor-fashion with enveloping tread, to enable traffic over snow, sand, stones, and any irregular ground.

The Kegresse-Hinstin Automobile-Tractor. Le Propulseur Kégresse-Hinston). A. Contet. Technique Automobile et Aérienne, vol. 14, no. 120, 1923, pp. 1–4, 5 figs. A 6-wheel automobile whose two rear wheels are equipped with tractor tread.

Triumph. The New 10-Hp. Triumph. Autocar, vol. 50, no. 1434, Apr. 13, 1923, pp. 594–597, 10 figs. Details of two-seater four-speed car manufactured by motorcycle firm; 4-cylinder water-cooled engine.

Vinot. The 12-25 Hp. Vinot. Auto-Motor Jl., vol. 28, no. 12, Mar. 22, 1923, pp. 241–244, 11 figs. Engine capable of developing 30 hp. at 2500 r.p.m.; valve gear distinctive feature; unique clutch arrangement.

Waverly. Testing two Waverley Models. Autocar, vol. 50, no. 1431, Mar. 23, 1923, pp. 492–493, 3 figs. Comparative trials of 4- and 2-seater-type 11-hp. chassis, which have same engine but different bodies and equipment.

AVIATION

Formation Flying. Maneuvering Aircraft in Formation. Edward L. Ericsson. Coast Artillery Jl., vol. 58, no. 3, Mar. 1923, pp. 225–233, 7 figs. Importance and requisites of formation flying.

Military. Some Phases of the Effect of Aircraft on the Future Mission, Organization, Equipment and Tactics of the Coast Artillery Corps. Thomas R. Phillips. Coast Artillery Jl., vol. 58, no. 3, Mar. 1923, pp. 203–224. Future naval development resulting from present tendencies; future naval tactics; strategy of national coast defense with combined forces; tactics of air defense; requirements of adequate defense; present defense measures and their deficiencies.

Russia. Aviation in Russia. Aeroplane, vol. 24, no. 9, Feb. 28, 1923, p. 158. Gives disposition of Red air force in European Russia.

B

BAGASSE

Use as Fuel. Utilization of Bagasse Fuel. Zuce Kogan. La. Planter & Sugar Mfr., vol. 70, no. 18, May 5, 1923, p. 349, 3 figs. Discusses question of fuel beds.

BALANCING MACHINES

Gravity. The Krupp Gravity Balance (Die Kruppsche Schwerpunktwage). H. Hort. Gewerbefleiss, vol. 102, no. 4, Apr. 1923, pp. 97–101, 5 figs. Describes apparatus for balancing rotating parts such as disks and rotors.

BEARING METALS

Anti-Friction. A Note on White Anti-Friction Alloys. J. E. Hurst. Metal Industry (Lond.), vol. 22, no. 15, Apr. 13, 1923, pp. 357–358, 5 figs. Account of bearing-metal case examined by author, in which failure of bearing was due entirely to overheating and seizing.

Testing. Testing Bearing Metals and Lubricants. F. Johnstone-Taylor. Am. Mach., vol. 58, no. 19, May 10, 1923, pp. 700–702, 3 figs. Account and results of extensive laboratory experiments made in England. Measurement of oil film; experiment with Michell pads; and with bearing metals.

Thermit. "Thermit," a New Bearing Metal (Ein neues Lagermetall "Thermit"). Technische Blätter, vol. 13, no. 16, Apr. 21, 1923, pp. 113–114, 4 figs. Wear of lead and tin bearings; composition, casting and properties of new bearing metal produced by Teho Co., Berlin.

BEARINGS

Babbitted. Methods of Making Babbitted Bearings. Fred H. Colvin. Am. Mach., vol. 58, no. 20, May 17, 1923, pp. 735–737, 8 figs. Special machine for casting babbitt lining and double-headed fixture for boring and facing; form grinding with built-up wheel.

BEARINGS, ROLLER

Spherical Type. The Spherical-Type Roller Bearing. H. E. Brunner. Wood-Worker, vol. 42, no. 2, Apr. 1923, pp. 56–57, 2 figs. Describes construction and analyzes design from technical point of view of new type of roller bearing.

Tests. Roller-Bearing Tests in England. Elec. Ry. Jl., vol. 61, no. 16, Apr. 21, 1923, pp. 682–683, 4 figs. Tests carried by Nat. Physical Laboratory in London and Wigan on Hoffmann bearings.

BELTING

Leather. New Findings on Transmission of Power by Leather Belting. J. Edgar Rhoads and R. R. Tatnall. Belting, vol. 22, no. 4, Apr. 1923, pp. 38, 40, 44, 46 and 48, 7 figs. Considers step by step factors having to do with power transmission. Big overloads possible because coefficient of friction increases with slip; improved production makes belts carry a third more power than formerly.

Rubber. Rubber Belting for Mill Use. C. M. Howard. Wood-Worker, vol. 42, no. 1, Mar. 1923, pp. 65–66, 2 figs. Recommendations for operation and care of rubber belts.

Steel. Performance Tests of Steel Belts with Compressed Spruce Pulleys. Garth L. Young and Guido V. D. Marx. Mech. Eng., vol. 45, no. 4, Apr. 1923, pp. 216–217, 2 figs. Particulars regarding an investigation of performance of welded and continuous steel belts running on compressed-spruce pulleys not specifically faced.

BICYCLES

Brakes and Stearing Mechanism. Velocipede, Cycle, and Like Vehicle Brakes, Steering-Mechanism, and Miscellaneous Accessories. Abridgments of Specifications, class 136 (i), period 1909–15, 1922, 168 pp. Patents for inventions.

BLAST-FURNACE GAS

Burners. Burning Blast Furnace Gas. Grant D. Bradshaw. Blast Furnace & Steel Plant, vol. 11, no. 4, Apr. 1923, pp. 250–252, 5 figs. Classification of burners; details of number of tests.

BLAST FURNACES

Blowing-in. Blowing-in a Blast Furnace (Mise à feu des hauts-fourneaux). Maurice Derclaye. Revue de Métallurgie, vol. 20, no. 4, Apr. 1923, pp. 209–234, 11 figs. Composition of charge; furnace operations; difficulties met with in starting a furnace.

Progress. Progress in Iron Blast-furnace Practice. Ralph H. Sweetser. Min. & Metallurgy, vol. 4, no. 197, May 1923, pp. 247–249. Wider acceptance of fact that satisfactory results are largely dependent on coke quality; ash in coke an economic waste; enrichment of mixture; furnace capacity; blast-furnace labor; research work.

Reconstruction. Recently Rebuilt Blast Furnace Lorain No. 4 National Tube Company. Blast Furnace & Steel Plant, vol. 11, no. 5, May 1923, pp. 269–271, 4 figs. Furnace at Lorain, Ohio, embodies changes and improvements which insure better average operating condition and increased tonnage; provisions made for future enlargements.

BLOWERS

Turbo. Results of Tests on an Escher Wyss & Cie Turbo-Blower (Versuchsergebnisse an einem Turbogebläse Bauart Escher Wyss & Cie. P. Ostertag Schweizerische Bauzeitung, vol. 81, nos. 14 and 15, Apr. 7 and 14, 1923, pp. 165–168 and 181–183, 15 figs. Tests were carried on one of three blast-furnace blowers delivered to Royal Dutch Blast Furnace & Steel Works, The Hague, Holland. Description and regulation of blower; experimental apparatus and results.

BOILER FEEDWATER

Deaeration. Deaeration of Feed Water. Elec. Times, vol. 63, no. 1640, Mar. 22, 1923, pp. 295–296, 3 figs. Deals with system of Contraflo Condenser & Kinetic Air Pump Co. for deaeration of feed for water-tube boilers, recommends type of deaerator in which heater is combined with deaerator, lower part of apparatus containing bank of steam-heated tubes over which water falls.

Oxygen Estimation. Estimating Dissolved Oxygen in Water. Power Engr., vol. 19, no. 205, Apr. 1923, pp. 144 and 146, 1 fig. Simple testing apparatus and method for determining amount of oxygen dissolved in sample of water.

Treatment. Industrial Waters (Les eaux Industrielles). G. Paris. Chimie & Industrie, vol. 9, no. 3, Mar. 1923, pp. 439–453, 10 figs. Deals with boiler-feed and other waters. Modern methods of purification; filtration and filters; chemical, thermic, and electrolytic purification; elimination of iron and gas; separating oil.

BOILER FURNACES

Arch Design. The McLeod & Henry Flat Suspended Furnace Arch. Power, vol. 57, no. 21, May 22, 1923, p. 795, 2 figs. Describes new type of flat suspended sectional furnace arch, in which any single block can be removed either from underneath or above, without disturbing any other block or suspension.

Firebars, Alloy for. The Burning of Cast Iron. Power Engr., vol. 19, no. 205, Apr. 1923, p. 143, 3 figs. Describes new alloy for firebars known as Usco alloy.

BOILER INSPECTION

Locomotive Boilers. Condensed Rules for Inspecting Locomotive Boilers. W. R. Hedeman. Boiler Maker, vol. 23, no. 3, Mar. 1923, pp. 59–62 and 84, 3 figs. Outline of work of a boiler inspector, also method of making repairs.

BOILER OPERATION

Steam-Data Chart. Graphic Determination of Steam Data and Factors of Evaporation. H. C. Linderman. Blast Furnace & Steel Plant, vol. 11, no. 5, May 1923, pp. 291–293, 2 figs. Graphical method of finding factor of evaporation and total heat when temperature, pressure, superheat and quality of steam and boiler feedwater are given.

BOILER PLANTS

Hand-Fired, Steam Economy of. Cutting Steam Costs in Hand Fired Boiler Plants. A. R. Mumford. Power House, vol. 16, no. 8, Apr. 20, 1923, pp. 33–36, 1 fig. 30 per cent saving in fuel costs effected by few simple changes in furnaces and in control of operation of boilers.

BOILER TUBES

Replacing. Fixing Boiler Tubes (Die Befestigung der Siederohre). Praktische Maschinen-Konstrukteur, vol. 56, no. 1, Jan. 5, 1923, pp. 1–2, 3 figs. Describes new machine for replacing boiler tubes, made by Hanover Machine Co.

BOILERS

Heat Transference and Combustion. Heat Transference and Combustion Tests in Small Domestic Boiler. John Blizard, W. M. Myler, Jr., J. K. Seabright and C. P. Yagloglau. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 4, May 1923, pp. 317–343, 17 figs. Report of series of tests made with various fuels and with and without secondary air.

Locomotive. See LOCOMOTIVE BOILERS.

BONUS SYSTEMS

Group. A Group Bonus Plan That Reduces Costs. J. R. Rogers. Factory, vol. 30, no. 5, May 1923, pp. 538–540, 1 fig. Describes plan which does away with much of costly routine required in gaging actual performance of individual workman; applicable in both large and small plants.

BOXES

Cardboard, Machinery for Making. Machines for the Manufacture of Cardboard Boxes (Les machines pour la fabrication des boites en carton). P. Boudreaux. Génie Civil, vol. 82, nos. 14 and 15, Apr. 7 and 14, 1923, pp. 317–322 and 346–350, 85 figs. The various processes and machinery used.

BRAKES

Air. Air Braking Six-Wheelers. Motor Transport, vol. 36, no. 939, Feb. 26, 1923, pp. 264–266, 4 figs. Explanation of Westinghouse pressure system as applied to new Leyland-Carrimore vehicle.

Airbrake Equipment, Reclaiming. Reclaiming Airbrake Equipment. Ry. Jl., vol. 29, no. 3, Mar. 1923, pp. 18–20, 5 figs. Methods employed at reclamation plant of Santa Fe system at Chicago.

Power. The Development and Importance of Power Brakes in Transportation. W. E. Symons. Ry. & Locomotive Eng., vol. 36, no. 4, Apr. 1923, pp. 129–131. Review of experience in United States and present situation in India; value of brakes in controlling factors of transportation.

BRASS

Foundry Alloys. Modern Brass Foundry Alloys. Francis W. Rowe. Foundry Trade Jl., vol. 27, no. 350, May 3, 1923, pp. 354–359, 12 figs. Deals with tin and phosphor bronzes, gun metals, brasses, manganese and aluminum bronzes, nickel alloys, copper castings and light aluminum alloys.

BRONZE

Coronium. A New Bronze Alloy. E. Hall Craggs. Foundry Trade Jl., vol. 27, no. 350, May 3, 1923, p. 359. Physical properties of new alloy allied to bronze, known as coronium. (Abstract.) Paper read before Cleveland Instn. Engrs.

C

CALORIMETERS

Electric Heating. Note on the Electric Heating of Calorimeters. Walter P. White. Wash. Acad. of Sci.—Jl., vol. 13, no. 2, Jan. 19, 1923, pp. 17–28, 1 fig. Deals with features of electric standardization which need attention in working to 30 per million; conduct of determinations, and error from heat produced in leads.

CAR WHEELS

Steel, Thermal Stresses in. Thermal Stresses in Steel Car Wheels. George K. Burgess and G. Willard Quick. U. S. Bur. of Standards—Tech. Papers, vol. 17, no. 235, Mar. 24, 1923, pp. 367–403, 38 figs. 19 steel wheels were tested by using method described for testing chilled-iron car wheels in laboratory under conditions approximating those encountered in service caused by heavy brake application; data on properties of wheels tested.

CARBURETORS

Eagle. Eagle Carburetor Has Dash Control for Auxiliary Air. Automotive Industries, vol. 48, no. 19, May 10, 1923, p. 1029, 1 fig. Carburetor is of plain-tube type with single nozzle for normal operation and jet just above butterfly throttle valve for idling.

Future Development. Future of Carburetor Lies in Detail Development, Not New Inventions. H. Dechamps. Automotive Industries, vol. 48, no. 16, Apr. 19, 1923, pp. 878–883, 16 figs. Points out that greater accessibility and ease of adjustment are much needed; discusses existing devices

Manufactured by Advertisers CLASSIFIED LIST OF MECHANICAL EQUIPMENT Alphabetical List on page 140

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Ore and Rock
* Nordberg Mfg. Co.

Crushers, Roll
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cupolas
* Bigelow Co.
Northern Engineering Works
Whiting Corp'n

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
* Whitney Mfg. Co.

Cylinders Rebored
* Hooven, Owens, Rentschler Co.

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Diaphragms, Rubber
United States Rubber Co.

Die Castings
(See Castings, Die Molded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Thread Cutting
Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Drafting Room Furniture
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Drawing Instruments and Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Lidgerwood Mfg. Co.
* Morris Machine Works

Dredging Sleeve
United States Rubber Co.

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.
* Ingersoll-Rand Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
* Johns-Manville (Inc.)
Manufacturing Equip. & Engrg. Co.

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.
Link-Belt Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Philadelphia Drying Machy. Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
Clarage Fan Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.

Dyeing Machinery
Philadelphia Drying Machy. Co.

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Electrical Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Electrical Supplies
* General Electric Co.
* Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Elevators, Electric
Northern Engineering Works

Elevators, Hydraulic
Whiting Corp'n

Elevators, Passenger and Freight
Northern Engineering Works

Elevators, Pneumatic
Whiting Corp'n

Elevators, Portable
Link-Belt Co.

Elevators, Telescopic
Link-Belt Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
* Nordberg Mfg. Co.

Engine Stops
* Schutte & Koerting Co.

Engines, Blowing
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Novo Engine Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Westinghouse Electric & Mfg. Co.

Engines, Gasoline
Midwest Engine Corp'n
Novo Engine Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
Clyde Iron Works Sales Co.
* Hooven, Owens, Rentschler Co.
* Lidgerwood Mfg. Co.
* Morris Machine Works
* Nordberg Mfg. Co.

Engines, Kerosene
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
* Nordberg Mfg. Co.
Sterling Engine Co.
* Ward, Chas. Engineering Wks.
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.

Engines, Marine, Steam
* Nordberg Mfg. Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
Otto Engine Works
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
*Allis-Chalmers Mfg. Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Nordberg Mfg. Co.
Sterling Engine Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
* Titusville Iron Works Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Leffel, James & Co.
* Troy Engine & Machine Co.
* Westinghouse Electric & Mfg. Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
Mackintosh Hemphill Co.
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engine, Steam, High Speed
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engines, Steam, Throttling
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
Stumpf Una-Flow Engine Co. (Inc.)

Engines, Steam, Variable Speed
* Brownell Co.
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Exhaust Heads
Hoppes Mfg. Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
Clarage Fan Co.

Exhausters, Gas
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Extractors, Centrifugal
Tolhurst Machine Works

Extractors, Oil and Grease
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Machy. Co.

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Filters, Gravity
* Permutit Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Graver Corp'n
* Permutit Co.

Filters, Water
Elliott Co.
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* U. S. Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Steel
* Crane Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Sum. The Sum Carburetor (Der Sum-Vergaser), Carl Wirsum. Motorwagen, vol. 26, no. 9, Mar. 31, 1923, pp. 145-146, 3 figs. New type of multi-state spray carburetor, in which fuel is thoroughly atomized, so that any kind of fuel can be used.

CARS

Aluminum Parts. Weight Reduction in Rolling Stock. Elec. Rev., vol. 92, no. 2370, Apr. 27, 1923, pp. 644-646, 4 figs. Discusses use of aluminum and its alloys for purpose of reducing weight of cars, and refers to parts of car equipment which could be satisfactorily lightened by adoption of aluminum.

CARS, FREIGHT

Boyden Coordinating Truck. The Boyden Six-Wheel Coordinating Truck. Ry. Mech. Engr., vol. 97, no. 5, May 1923, pp. 285-287, 6 figs. Designed to provide extreme flexibility in order to minimize curve resistance and flange wear.

Inspection. Prize Articles in Contest in Car Inspection. Ry. Mech. Engr., vol. 97, no. 5, May 1923, pp. 281-284, 4 figs. Contains following two articles: The Inspection and lubrication of Freight Cars, A. J. Mitchener; Interchange and Industrial Inspection of Freight Train Cars, W. J. Owen.

CARS, PASSENGER

Anti-Collision Buffers and Fenders. Collision at Marylebone Demonstrates Utility of Corrugated Fenders and Anti-Collision Buffers. Ry. Gaz., vol. 38 no. 18, May 4, 1923, pp. 688-695, 17 figs. Recent collision on Lond. & North Eastern Ry. demonstrated efficacy of corrugated fenders, anti-collision buffers and armored ends with which passenger cars are fitted.

Design. Passenger Carriages, Int. Ry. Congress Assn.—Bul., vol. 5, no. 4, Apr. 1923, pp. 344-365. Discussion on improvements to be made in design of carriages and rules to be observed in make-up of trains, so as to increase safety and comfort of passengers.

CASE-HARDENING

Roller Bearings. Casehardening Plant, Timken Roller Bearing Co., E. W. Ehn. Chem. & Met. Eng., vol. 28, no. 13, Mar. 28, 1923, pp. 578-587, 11 figs. Over 2,000,000 roller-bearing parts are hardened daily; special furnaces and quenching machines; slow, mild carburizer used exclusively.

CAST IRON

Hardness Control. Controlling Cast Iron Hardness, S. J. Felton. Foundry, vol. 51, no. 8, Apr. 15, 1923, pp. 321-322. Metallographic study showing different constituents indicates causes of hardness; control methods; close-grained iron not apt to be porous but has large internal shrinkage.

Pearlitic. Pearlitic Cast Iron, Its Production, Properties of Strength and Useful Possibilities (Das Perlitgusseisen, seine Herstellung, Festigkeitseigenschaften und Anwendungsmoglichkeiten), O. Bauer. Stahl u. Eisen, vol. 43, no. 17, Apr. 26, 1923, pp. 553-557, 7 figs. Describes method for obtaining pearlite-graphite texture in cast iron; strength properties of pearlitic iron in comparison with other varieties of cast iron; technical uses of pearlitic castings and review of development of gray castings.

Physics of. Physics of Cast Iron, E. Adamson. Foundry Trade Jl., vol. 27, no. 349, Apr. 26, 1923, pp. 332-336. Replies of author to criticisms by J. E. Hurst and H. J. Young of his paper printed in same journal, Mar. 29, 1923.

CHROME STEEL

Properties. Some Mechanical Properties of a Series of Chromium Steels, Charles R. Austin. Iron & Steel Inst., advance paper, no. 3, for meeting May 1923, 15 pp., 4 figs. Record of effect of heat treatment on mechanical properties of two groups of steels, containing 0.35 per cent carbon and 1 per cent carbon, respectively, chromium content varying from 2 to 12 per cent.

CLUTCHES

Friction. Friction Clutch Data, G. W. Drake. Am. Mach., vol. 58, no. 20, May 17, 1923, pp. 729-732. Methods of finding capacity, tractive force and efficiency of many types of clutches used for different purposes and operating at various speeds and under diverse conditions.

Types. Clutches. Maschinenbau vol. 2, no. 10, Feb. 21, 1923. Contains following articles: Spiral-Spring Feed Mechanism and Compensating Coupling (Schraubenfeder-Schaltwerk bezw. Ausgleichkupplung), Carl Schurmann, pp. G105-G111, 35 figs.; Coupling of Machine Sets (Kupplung von Maschinensatzen), W. Kieser, pp. G111-G113, 7 figs.; Electromagnetic Friction Clutches (Elektromagnetische Reibungskupplungen), J. Pietsch, pp. G114-G116, 11 figs.; Friction Clutches (Reibungskupplung), Horst Landor, pp. G116-118, 3 figs.; Rigid Couplings for the Connection of Transmission Shafts (Feste Kupplungen zur Verbindung von Transmissionswellen), Fr. Schinke, pp. G118-G119, 5 figs.

COAL

Calorific Value, Determination. Determination of the Calorific Value of Coal (Vereinfachte Bestimmung des Heizwertes der Kohle), Fritz König. Chemiker-Zeitung, vol. 47, no. 47, Apr. 19, 1923, pp. 335-336. Describes new and simple method based on knowledge of water and ash content and yield in coke.

Moisture Content. The Specific Gravity and Moisture Content of Coal, T. J. Drakely and W. O. Jones. Chem. & Industry, vol. 42, no. 16, Apr. 20, 1923, pp. 163T-166T, 2 figs. Investigation to determine standard method of preparation of coal sample which might be generally adopted; deals with saturation, drying, and air drying of coal samples; moisture content of coal.

Spontaneous Combustion. The Spontaneous Combustion of Coal in Relation to its Composition and Structure, Marie C. Stopes and R. V. Wheeler. Fuel in Sci. & Practice, vol. 2, no. 4, May 1923, pp. 122-132, 5 figs. Oxidation and ignition of ingredients of banded coal. Relative ignition temperature of durain, clarain and vitrain; relative rates of absorption of oxygen by four coal ingredients. Notes on the views of previous authors on "dull" and "bright" bands in ordinary coal.

Protecting Coal in Confined Spaces Against Spontaneous Combustion (Schutz von Steinkohlen in abschliessbaren Räumen gegen Selbstentzündung), W. Schmaltz. Wärme, vol. 46, no. 8, Feb. 23, 1923, pp. 81-85. Protection of coal on board ship; cause of spontaneous combustion; protection by using agents combining with oxygen such as oxidation of iron at low temperature.

COAL STORAGE

Methods. Storage of Bituminous Coal, Andress Allen. Black Diamond, vol. 70, no. 11, Mar. 17, 1923, pp. 288-289 and 310, 3 figs. Advantages and disadvantages of coal storage; various kinds of storage plants and operating characteristics of each.

COKE

Foundry and Furnace. Foundry and Furnace Coke Compared, H. Koppers. Iron Age, vol. 111, no. 12, Mar. 22, 1923, pp. 825-827. Finishing temperatures in ovens affect quality; law of Bourdouard's equilibrium; specifications for furnace and foundry coke and simple test. Translated from Giesserei, and commented on by Richard Moldenke.

COMBUSTION

Furnaces, Coal-Fired. Chemistry of Combustion in Coal-Fired Furnaces, W. K. Lewis. Indus. & Eng. Chem., vol. 15, no. 5, May 1923, pp. 502-503, 1 fig. Résumé of results of investigations by Bur. of Mines of combustion reactions in fuel bed, together with interpretation of their significance in light of other work in this field.

CONDENSERS, STEAM

Ejecteau-Air. Ejecteau-Air Condenser. Power Plant Eng., vol. 27, no. 10, May 15, 1923, p. 516, 1 fig. Combination water and air pump and steam condenser of French design.

CONVEYORS

Marcus. Shaking-Sliding Conveyor and the Marcus Acceleration Process (Die Schuttelrutschenforderung und das Beschleunigungsverfahren von Marcus), Otto Ohnesorge. Fordertechnik u. Frachtverkehr, vol. 16, no. 4, Feb. 16, 1923, pp. 37-40, 5 figs. Describes principles of acceleration process in conveying and its application in mining, and reviews apparatus leading up to its development.

COOLING LIQUIDS

Safety Devices for. Safety Devices for Circulating Systems. Engineering, vol. 115, no. 2993, May 11, 1923, pp. 584-585, 22 figs. Monitor safety devices for application to cooling-water supply systems of air compressors, oil and gas engines, electric controllers for large winders, transformers, etc., as well as to oil-cooling systems for large bearings, gearing and thrust blocks.

COPPER ALLOYS

Melting and Casting. Melting and Casting Copper Alloys (Quelques Considérations à propos de la Fusion et du Moulage des Alliages de Cuivre.) Fonderie Moderne, vol. 17, Mar. 1923, pp. 76-78. Chemical properties of some metals; fluxes, reducing agents and their properties.

CORE BOXES

Construction. Construction of Coreboxes, Joseph Horner. Foundry, vol. 51, nos. 4 and 5, Feb. 15 and Mar. 1, 1923, pp. 157-160 and 188-192, 32 figs. Methods which present features more or less out of ordinary.

CORROSION

Theory and Practice. Practical and Theoretical Aspects of Corrosion, W. R. Douglas Shaw. Beama, vol. 12, no. 61, May 1923, pp. 269-273. Author endeavors to throw more light on unexplained phenomena of corrosion; discusses corrodibility of alloys; corrosive mine water, corroded economizers, turbine practice, eddying in pumps, absorption and corrosion, etc.

COST ACCOUNTING

Factory. Practical Cost-Accounting System. Wood-Worker, vol. 42, no. 2, Apr. 1923, pp. 48-50, 7 figs. Describes system of figuring costs which has proved very satisfactory in wooden-toy factory.

Production. Nature and Bases of Calculating Cost of Production (Wesen und Grundlagen der Selbstkostenberechnung), Kurt Maier. Gummi-Zeitung, vol. 37, nos. 15-16, 19-20 and 27-28, Jan. 19, Feb. 16 and Apr. 13, 1923, pp. 233-234, 296-297 and 438-439. Definition of cost of production; kinds of costs; distribution of costs; methods of determining costs.

Standardization. Standardisation in Cost Accountancy, H. G. Jenkins. Indus. Management (Lond.), vol. 9, no. 6, Mar. 22, 1923, pp. 177-178. Advantages and difficulties; cost figures and trade depression; fundamental principles; principles formulated. Paper read before Instn. Cost & Works Accountants. See also (discussion) in no. 7, Apr. 5, 1923, pp. 205-208.

Time-Saving Plan. More Accurate Costs in Less Time, H. A. Krill. Factory, vol. 30, no. 5, May 1923, pp. 545-547, 5 figs. Plan for tying up operation costs with payroll disbursements readily adaptable to any plant, large or small.

COTTON MILLS

Four-Roll Drafting. Four Roll Drafting on Roving Frames, A. N. Sheldon. Textile World, vol. 63, no. 17, Apr. 28, 1923, pp. 147-148. Experiments to show its effect on yarn strength and evenness, number of processes, drafts and doublings; gentler treatment of fiber and better parrallelization claimed. From paper read before Textile Division, A.S.M.E.

Weaving. Variations of Efficiency in Cotton Weaving. Engineering, vol. 115, no. 2990, Apr. 20, 1923, pp. 498-499. Review of report by S. Wyatt issued by Indus. Fatigue Research Board. Investigations to determine nature and general effect of factors that influence efficiency and fatigability of weavers.

CRANES

Electric. Electric Gantry Crane of 25 Tons at the Zurich Freight Station (Portique roulant de 25 tonnes, avec commande électrique, à la gare des marchandises de Zurich), W. Druey. Bul. Technique de la Suisse Romande, vol. 49, no. 8, Apr. 14, 1923, pp. 91-97, 5 figs. Details of design and construction.

Rotary. Slewing Crane of 60 Tons Capacity, at Harfleur Navy Yard (Grue pivotante et basculante de 60 tonnes, installée aux Chantiers navals d'Harfleur). Génie Civil, vol. 82, no. 15, Apr. 14, 1923, pp. 341-343, 4 figs. For loading boilers, turbines and other heavy machinery; design and operation.

Steam. Steam Cranes (Der Dampfkran im Eisenbau), Benedict. Bautechnik, vol. 1, no. 18, Apr. 27, 1923, pp. 169-170, 3 figs. Advantages of locomotion and transportation; comparison with electric cranes.

CRANKSHAFTS

Critical Speeds. Torsional Resonance, J. Morris. Automobile Engr., vol. 13, no. 175, Apr. 1923, p. 113, 4 figs. Consideration of critical speeds of crankshafts.

CUPOLAS

Charging. Devise Flexible Charging System. Iron Trade Rev., vol. 72, no. 17, Apr. 27, 1923, pp. 1237-1240, 7 figs. Charging methods and equipment of Muncie Foundry & Machine Co., Muncie, Ind.; includes outside and inside traveling cranes and charging hoist for handling materials from railway car to yard and from yard into cupola.

Mechanical Charging of Cupola Furnaces (Note sur le chargement méchanique des cubilots), Leon Thomas. Fonderie Moderne, vol. 17, Mar. 1923, pp. 63-66, 3 figs. Principles of mechanical charging; describes several methods employed with success.

Reactions. Theorizes on Cupola Reactions S. J. Felton. Foundry, vol. 51, no. 9, May 1, 1923, pp. 351-352, 1 fig. Work of different investigators reviewed to show location and effect of melting zone; flexibility of cupola as melting furnace; slag reactions.

Weighing and Charging Device. A Weighing and Charging Device for Cupolas. Metal Industry (Lond.), vol. 22, no. 17, Apr. 27, 1923, pp. 425-426, 1 fig. Describes useful and simple device for weighing and charging of material to cupola, suitable for small foundry. Translated from Fonderie Moderne.

CUTLERY

Manufacture. Turns to Making Pocket Knives, B. K. Price. Iron Trade Rev., vol. 72, no. 13, Mar. 29, 1923, pp. 954-956, 5 figs. Remington Arms Co. utilizes expanded capacity at end of war for production of one line of cutlery; output is expedited by use of special machinery and standardization of parts.

CUTTING METALS

Electric Arc Cutting. Electric Arc Cutting, A. M. Candy. Welding Engr., vol. 8, no. 4, Apr. 1923, pp. 36 and 38, 9 figs. Graphite or carbon electrodes used; process applied to cutting risers and rivets; economical for cutting copper.

CUTTING TOOLS

Design. Metal Cutting Tools, W. E. Splain. Am. Mach., vol. 58, no. 18, May 3, 1923, pp. 663-664, 2 figs. Factors affecting speed with which tool cuts economically; angles of tools for cutting different metals; why round-nosed tools are best.

CYLINDERS

Reboring. Reboring Automobile Cylinders, George Wilson. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 700-701, 3 figs. Boring on milling machine and in lathe.

D

DIESEL ENGINES

Developments. The Development of Diesel Engines at the Krupp Concern (Aus der Entwicklung des Dieselmotors bei der Firma Krupp). Kruppsche Monatshefte, vol. 4, Feb.-Mar. 1923, pp. 25-39, 22 figs. Initial development as stationary engine; development as marine engine before and during war, U-boat engines; development since the war; compressors.

Manufacture. Building Diesel Engines. Eng. Production, vol. 6, nos. 127 and 128, Apr. and May 1923, pp. 237-241 and 259-263, 26 figs. Methods and equipment of Mirrlees Watson Co., Glasgow, Scotland.

Operating Costs. Report on Heavy-Oil Engine Working Costs. Diesel Engine Users Assn.—Report, no. 31, 19 pp. Report submitted at meeting

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 140

Flanges
* American Spiral Pipe Works
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flooring, Rubber
United States Rubber Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Co.
* Nordberg Mfg. Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Furnace & Burner Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Foundry Equipment
Northern Engineering Works
Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Whiting Corp'n

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Detroit Electric Furnace Co.
Kenworthy, Chas F. (Inc.)

Furnaces, Forging
Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
Kenworthy, Chas F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
Detroit Electric Furnace Co.
* General Electric Co.
Whiting Corp'n

Furnaces, Non-Ferrous
Detroit Electric Furnace Co.

Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co.
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
* Johns-Manville (Inc.)

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Glasses
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Gages, Differential Pressure
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Draft
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Liquid Level
* Bristol Co.
* Lunkenheimer Co.
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
* Norma Co. of America

Gages, Pressure
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gages, Water Level
* Bristol Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge and Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gas Analysis Apparatus
* Precision Instrument Co. (Inc.)

Gas Collectors
* Precision Instrument Co. (Inc.)

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Iron, Corrugated
Smooth-On Mfg. Co.

Gaskets, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Gasoline
Texas Co.

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.

Gears, Cut
Brown, A. & F. Co.
Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Philadelphia Gear Works
* Poole Engrg. & Mch. Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Herringbone
* Falk Corporation

Gears, Machine Molded
Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.
Philadelphia Gear Works

Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Falk Corporation
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.
Link-Belt Co.
* Poole Engrg. & Mach. Co.
* Westinghouse Electric & Mfg. Co.

Gears, Worm
Chain Belt Co.
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Westinghouse Electric & Mfg. Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Governors, Engine, Oil
* Nordberg Mfg. Co.

Governors, Engine, Steam
* Nordberg Mfg. Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Kieley & Mueller (Inc.)

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Grinding Machinery
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Guards (Electric Lamp)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Franklin Machine Co.
Long & Allstatter Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hangers, Shaft
Brown, A. & F. Co.
* Falk Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball Bearin
* Hyatt Roller Bearing Co.
* S K F Industries (Inc.)

Hangers, Shaft (Roller Bearing)
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mach. Co.

Hard Rubber Products
United States Rubber Co.

Hardening
* American Metal Treatment Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Mar. 2, 1923, including discussion. Costs per unit generated; maintenance, working and fuel-oil costs. Bibliography.

Stephen-Sulzer. The Stephen-Sulzer Diesel Engine. Shipbuilder, vol. 28, no. 152, Apr. 1923, pp. 237–239, 1 fig. Data on single-acting, two-cycle, crosshead-type engine, with air injection and forced lubrication, developing 2000 b.hp. at 100 r.p.m.; table giving results of shop trial.

Werkspoor, Americanized. Americanization of an European Oil Engine. Gas & Oil Power, vol. 18, no. 212, May 3, 1923, p. 133, 1 fig. Details of New York-Werkspoor Diesel marine unit.

DRAWINGS

Numbering and Indexing. Numbering and Indexing Drawings, Edward Heller. Machy. (N. Y.), vol. 29, no. 8, Apr. 1923, pp. 609–610, 4 figs. System established in large shop devoted to manufacture of extensive line of aluminum and enameled steel utensils; index cards; record of tools made without drawings; index cards arranged in alphabetical order.

Tracings, Care of. The Care of Tracings, Dwight C. Howard. Am. Mach., vol. 58, no. 13, Mar. 29, 1923, pp. 479–480. Value of tracings; how table should be cleaned and covered; keeping cloth clean while tracing; old tracings restored.

DROP FORGINGS

Manufacture. The Manufacture of Drop Forgings, Arthur Stubbs. Metal Industry (Lond.), vol. 22, nos. 12, 13, 17 and 18, Mar. 23, 30, Apr. 27 and May 4, 1923, pp. 287–289, 315–316, 427–428 and 454–456, 9 figs. Design; hardening of dies; quenching arrangements; casting and ingots; preliminary heat treatment; tools for drop forgings; final forging temperature; heating furnaces; connecting rods; crankshafts; etc. Choice of fuels; pyrometers; testing. Future of industry.

DRYING PLANTS

Hot-Air. The Design of Hot-Air Drying Plant, George H. Gill. Engineering, vol. 115, nos. 2991 and 2992, Apr. 27 and May 4, 1923, pp. 511–512 and 541–542. Types of hot-air driers which are divided into main classes, namely, batch, and continuous or tunnel-type driers; construction of driers; rate of drying; calculation of air supply.

DYNAMOMETERS

Fan-Brake. A New Fan Brake Dynamometer. Automobile Engr., vol. 13, no. 75, Apr. 1923, pp. 107–108, 2 figs. An enclosed type that may be adjusted while running.

E

EDUCATION, ENGINEERING

Technical School and Practical Training. The Training of Engineers (Zur Ingenieurerziehung), G. M. Strobl. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 17, Apr. 28, 1923, pp. 419–421. Refers to paper by G. Lippart in same journal (Dec. 16, 1922) on demands made upon technical schools for practical requirements of engineers. Present author recommends less theoretical and more practical mathematics; training of practical constructors in place of draftsmen, and closer cooperation between instructor and student.

EDUCATION, INDUSTRIAL

Russia. The Russian Central Institute of Work, Management Eng., vol. 4, no. 4, Apr. 1923, pp. 241–244, 14 figs. Methods and means for training workers. Translated from official documents.

ELECTRIC DRIVE

Woodworking Industry. Motor Applications in the Woodworking Industry, Gordon Fox. Power Plant Eng., vol. 27, no. 8, Apr. 15, 1923, pp. 428–430, 4 figs. Advantages of motor drives, especially induction motors; frequency changers for high speed.

ELECTRIC FURNACES

Acid. Operation of an Acid Electric Furnace, Thomas Hill. West. Machy. World, vol. 14, no. 4, Apr. 1923, pp. 128–130 and 148. Notes on acid and basic charges, charging; melting and oreing down; formation and functions of slag; power input; final additions; electrodes; etc.

Design. Design and Construction of Electric Furnaces, Larry P. Barton. Blast Furnace & Steel Plant, vol. 11, no. 5, May 1923, pp. 272–276, 6 figs. Comparative sizes of various types; practical wiring and diagrams.

Development. Recent Electric Furnace Developments, Edward T. Moore. Forging & Heat Treating, vol. 9, no. 4, Apr. 1923, pp. 187–192, 6 figs. Increase in installations during 1922; types of furnaces, including Heroult, Greaves-Etchells and Moore 'Lectromelt furnaces; density, electrical and thermal resistivity of electrodes; use of electric furnaces in non-ferrous field.

Induction. Heating by High-Frequency Induction (Chauffage par induction à haute fréquence), G. Ribaud. Technique Moderne, vol. 15, no. 8, Apr. 15, 1923, pp. 225–231, 15 figs. Historical review; describes various types of furnaces and their operation.

Non-Ferrous. New Induction Furnace for Non-ferrous Metals (Nouveau four électrique à induction pour les métaux non ferreux), Emile Demenge. Génie Civil, vol. 82, no. 9, Mar. 3, 1923, pp. 207–209, 3 figs. Design and operation of furnace built by Copagnie Française des Métaux, producing 8 to 10 tons of brass per day.

Operation. Electric Furnace Operation (La pratique des fours électriques). Journal du Four Electrique, vol. 32, nos. 5 and 6, Apr. 1 and 15, 1923, pp. 38–40 and 48–50. Summary of lectures by Perrin before Foundry Technical Assn. Advantages of electric furnace; describes three-phase Heroult type; refining of steel; cost data; melting furnaces for pig iron and non-ferrous metals.

Pyrelectrode. The Combustion-Flame Electrode, George T. Southgate. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 4, Apr. 1923, pp. 87–100 and (discussion) 101–104, 12 figs. Describes process and apparatus involving use of combustion flames as paths along which to induct electric arcs into furnaces or other spaces where work of high temperatures is desired; apparatus is called pyrelectrode.

Steel. Advantages of Electric Furnace in Steel Making, Ernest W. Cornelius. Can. Foundryman, vol. 14, no. 4, Apr. 1923, pp. 41–43, 1 fig. Product is of more uniform quality; meets demand for high standards; better temperature control; less loss in melting and refining; etc.

Three-Phase. Some Problems in Electric Furnace Operation, F. V. Andreae. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 5, May 1923, pp. 498–509, 14 figs. General equations of 3-phase furnace are developed; methods are suggested to reduce unbalancing of load.

ELECTRIC LOCOMOTIVES

4000-Hp. New 4000 Hp. Locomotives for the Norfolk & Western Railway, T. C. Wurts. Railroad Herald, vol. 27, no. 5, Apr. 1923, pp. 23–27, 4 figs. Describes Baldwin-Westinghouse, consisting of two cabs permanently connected to form a locomotive; single-phase current is collected from trolley and transformed inside locomotive to three-phase at voltage suitable for induction-type traction motors.

Italian. The Electrification of the Italian Railways, F. Savorgnan di Brazzi. Elec. Rev., vol. 92, no. 2367, Apr. 6, 1923, pp. 525–526, 2 figs. Describes new 3000-hp. 3-phase locomotive.

Vibrations. Natural Vibration of Systems with Periodically Variable Elasticity (Eigenschwingungen von Systemen mit periodisch veränderlicher Elastizität), L. Dreyfus. Archiv fur Elektrotechnik, vol. 12, no. 1, Mar. 10, 1923, pp. 38–59, 13 figs. Discusses shaking vibrations of electric locomotives and gives mathematical treatment of question of periodically variable elasticity connected with it.

ELECTRIC PLANTS

Gas-Engine-Driven. Generating Power at High Load Factor. Power Engr., vol. 18, no. 204, Mar. 1923, pp. 89–94 and 114, 14 figs. New film factory in Surrey, England, has combination plant erected to supply electric power, lighting and heating requirements. Details of producer plant, main engines, steam heating, etc.

ELECTRIC RAILWAYS

Car Maintenance. East Bay Electric Service of the Southern Pacific Railroad. Elec. Ry. Jl., vol. 61, no. 15, Apr. 14, 1923, pp. 633–637, 6 figs. Describes system of maintenance followed in order to keep maximum number of cars in service.

Cost Statistics. Statistical Data On Electrified Railroads, W. D. Bearce. Elec. Traction, vol. 19, no. 3, Mar. 1923, pp. 113–116, 3 figs. Comparison of cost of operation by steam and electric equipment.

ELECTRIC RAILWAYS, TRACK

Track Circuiting. Track Circuit Developments on the Underground Railways. Ry. Gaz., vol. 38, no. 15, Apr. 13, 1923, pp. 585–586, 3 figs. Installation of what is claimed to be latest development in a. c. track-circuiting work consists of 14 single-rail track circuits of condenser-feed type, using two-element vane relays, and six siding tracks with indication only.

ELECTRIC WELDING, ARC

Developments. Recent Developments in the Arc Welding Field, W. L. Warner. Am. Welding Soc.—Jl., vol. 2, no. 4, Apr. 1923, pp. 10–30. Standardization activities of Am. Bur. of Welding. General reports and research work on following subjects: specifications for steel to be welded; unfired pressure vessels; welding oil-storage tanks; welded rail joints; welding applications; welding monel metal; manufacture of pure iron; arc-welding apparatus. Suggested research activities.

ELEVATORS

Electric and Hydraulic. Electric and Hydraulic Lifts, C. H. J. Day. Power Engr., vol. 18, nos. 205 and 206, Apr. and May 1923, pp. 133–140 and 177–180 and (discussion) 180–181, 12 figs. Apr.: Notes on safety gears, guides, signaling devices controller operation of electric elevators, electric motors, methods of balancing, electric self-leveling elevator, suitable car speeds, passenger elevators, etc.

Motor Controllers. Operation of a Slow Speed Elevator Electric Motor Controller, Charles A. Armstrong. Power, vol. 57, no. 18, May 1, 1923, pp. 670–673, 8 figs. Detailed explanation of controller's operation; troubles that may develop and how to locate them.

Ropes. Life of Elevator Ropes, C. W. Naylor. Nat. Engr., vol. 27, no. 5, May 1923, p. 212. Length of service of elevator ropes in a modern department store; hints on care, service and selection.

EMPLOYEES' REPRESENTATION

Union Pacific R. R. The Union Pacific Plan of Employees Representation, G. H. Sines. Ry. Rev., vol. 72, no. 18, May 5, 1923, pp. 760–765. Shop and miscellaneous employees' association works with management to improve efficiency.

ENAMELING

Rust Elimination Before. Preventive Methods Eliminate Rust in Fender Enameling Process, J. Edward Schipper. Automotive Industries, vol. 48, no. 19, May 10, 1923, pp. 1026–1027, 3 figs. Precautions taken in enameling Hupmobile bodies at Detroit Auto Specialty Co.; causes of rust are eliminated before fenders are sent through enameling process, while elaborate precautions are taken to prevent rust-causing deposits on metal.

ENGINEERING

Problems. Some Problems Confronting the Engineer of Tomorrow, Carl S. Coler. Sibley Jl. of Eng., vol. 37, no. 3, Mar. 1923, pp. 52–55, 1 fig. Problems in various fields of engineering.

ENGINEERS

Classification of Positions. Progress in the Classification of Engineering Positions, A. B. McDaniel. Eng. News-Rec., vol. 90, no. 17, Apr. 26, 1923, pp. 744–745. Progress made by committee of Am. Assn. Engrs.

Training. The Training of Graduate Engineers (Ingenieurforthildung), O. Lasche. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 14, Apr. 7, 1923, pp. 341–344. Discusses work being done in Germany in organizing advanced courses for experienced and active engineers; courses planned by Assn. for Advancement of Industry, and other associations in Berlin; suggestions for further extension of this work; appendix contains account of experiences with so-called works students.

EVAPORATION

Internal Heat of. Relations Concerning the Internal Heat of Vaporization, J. E. Mills and P. K. Smith. Jl. Physical Chem., vol. 27, no. 4, Apr. 1923, pp. 301–321. Mathematical study.

Reaction Due to. The Reaction Consequent upon the Evaporation of a Liquid and upon the Emission of Vapours from Small Orifices, W. G. Duffield. Lond., Edinburgh & Dublin Philosophical Mag. & Jl. of Sci., vol. 45, no. 268, Apr. 1923, pp. 641–688, 10 figs. Describes type of interference between molecules of vapor and those of external medium, which appears to pay considerable part in phenomenon of evaporation and in discharge of vapor from boiler; manner in which vapor is discharged into atmosphere from boiling liquid.

F

FANS

Selection and Application. The Selection of Fans and Their Application, A. Fleming Browne. Power Engr., vol. 18, no. 204, Mar. 1923, pp. 105–109 and (discussion) 109–111. Ventilating fans; mechanical draft; cupola fans; dust and fume removal; drying plants; propeller fans; centrifugal fans; fan standardization.

Testing. Standard Code for the Testing of Centrifugal and Disc Fans. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 4, May 1923, pp. 371–380, 5 figs. Code framed by joint committee from Nat. Assn. Fan Mfrs. & Am. Soc. Heating & Vent. Engrs.

FIREBRICK

Old, Utilization of. Improved Method of Utilizing Old Firebrick, James A. Faulkner. Power, vol. 57, no. 20, May 15, 1923, pp. 754–756, 4 figs. New plan is to grind up old brick and add binder to make mortar for laying up of firebrick, and then to surface wall with layer of same material; coating is renewed once a month or as often as necessary.

FLAME PROPAGATION

Gaseous Fuel. The Measurement of Flame Velocity, Walter Mason. Fuel in Sci. & Practice, vol. 2, no. 4, May 1923, pp. 110–114, 8 figs. Points out that general behavior of gaseous fuel on burning can be judged from speed-percentage curve for uniform movement of flame in its mixtures with air, and describes how such speed-percentage curves are obtained.

FLIGHT

Gliders, Starting. Starting Gliders from Kite Balloons. Flight, vol. 15, no. 18, May 3, 1923, pp. 237–238, 2 figs. Describes scheme devised by a German inventor utilizing a kite balloon for starting glider.

Gliding. Soaring Flight (Segelflug), Erich Meyer. Schweizerische Bauzeitung, vol. 81, no. 9, Mar. 3, 1923, pp. 103–106, 13 figs. partly on p. 107. Analysis of soaring flight. Developments and future possibilities.

The Rhön Gliding Contest 1922 (Der Rhön Segelflug-Wettbewerb 1922), W. Schlink. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 13, no. 19–20, Oct. 30, 1922, pp. 261–274, 31 figs. Detailed account of airplanes and their performances. See also articles entitled Lessons Learned from the Rhön Contest (Lehren des Rhönflugs 1922), L. Prandtl, pp. 274–275; Requirements for the Development of Gliding Flight (Zur Frage der Förderung des Segel flugs), Wilh. Hoff, pp. 276–278, 6 figs.; and various articles dealing with problem of motorless flight, etc., including account of French gliding contest of Clermont-Ferrand, pp. 278–296, 14 figs.

FLOW OF WATER

Pipes. Law of Resistance to Flow in Pipe of Circular Cross Sections (Das Gesetz für den Durchflusswider-

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 140

Heaters, Water Supply
Herbert Boiler Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.
* Erie City Iron Works
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water, Metering
* H. S. B. W.-Cochrane Corp'n

Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
Clarage Fan Co.

Heating Specialties
* Fulton Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.

Hoisting Outfits
Novo Engine Co.

Hoists, Air
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n
Yale & Towne Mfg. Co.

Hoists, Electric
* Allis-Chalmers Mfg. Co.
* American Engineering Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
Yale & Towne Mfg. Co.

Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.
Novo Engine Co.

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Locomotive & Coach
Whiting Corp'n

Hoists, Mine
Lidgerwood Mfg. Co.
* Nordberg Mfg. Co.
Novo Engine Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Hoists, Steam
(See Engines, Hoisting)

Holders, Nipple
Curtis & Curtis Co.

Hose, Acid
United States Rubber Co.

Hose, Air and Gas
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Fire
United States Rubber Co.

Hose, Gas
United States Rubber Co.

Hose, Gasoline
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Metal, Flexible
* Johns-Manville (Inc.)

Hose, Oil
United States Rubber Co.

Hose, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Steam
United States Rubber Co.

Hose, Suction
United States Rubber Co.

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n

Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Worthington Pump & Machinery Corp'n

Hydraulic Machinery
* Allis-Chalmers Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Press Control Systems (Oil Pressure)
American Fluid Motors Co.

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
Taylor Instrument Cos.

Hygrometers
Taylor Instrument Cos.

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Nordberg Mfg. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Gifford-Wood Co.

Idlers, Belt
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Indicators, CO
* Uehling Instrument Co.

Indicators, CO_2
Bacharach Industrial Instrument Co.
* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.

Indicators, Engine
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Indicators, SO_2
* Uehling Instrument Co.

Indicators, Speed
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Injectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Inserts, Steel
Midwest Steel & Supply Co.

Instruments, Electrical Measuring
* General Electric Co.
Taylor Instrument Cos.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Instruments, Recording
* Ashton Valve Co.
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* General Electric Co.
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.
* Westinghouse Electric & Mfg. Co.

Instruments, Scientific
Taylor Instrument Cos.

Instruments, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Insulating Materials (Electric)
* General Electric Co.
* Johns-Manville (Inc.)

Insulating Materials (Heat and Cold)
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
United States Rubber Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.
* Lunkenheimer Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.

Keys, Machine
Smith & Serrell
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Ladles
Northern Engineering Works
Whiting Corp'n

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
* Johns-Manville (Inc.)
* Westinghouse Electric & Mfg. Co.

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Levers, Flexible (Wire)
* Gwilliam Co.

Linings, Brake
* Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Furnace & Burner Corp'n
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
McLeod & Henry Co.
* Quigley Furnace Specialties Co.

Linings, Stack
* Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n

Loaders, Portable
* Gifford-Wood Co.
Link-Belt Co.

Lockers, Metal
Manufacturing Equip. & Engrg. Co.

Locomotives, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Locomotives, Storage Battery
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Machine Tool Feed Control Systems (Oil Pressure)
American Fluid Motors Co.

Machine Work
Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Lammert & Mann Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Purvis Machine Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.
* Simplex Valve & Meter Co.

Mechanical Draft Apparatus
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Mechanical Stokers
(See Stokers)

Metal Treating
* American Metal Treatment Co.
Hyro Mfg. Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Precision Instrument Co. (Inc.)
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

stand in Rohrleitungen kreisförmigen Querschnittes), H. Lang. Bautechnik, vol. 1, no. 18, Apr. 27, 1923, pp. 174-175. Discusses Lang's formulas and his most recent proofs of their correctness.

FLUE-GAS ANALYSIS

CO_2 Recorder. Mechanical Force Made Use of to Indicate CO_2. Power Plant Eng., vol. 27, no. 10, May 15, 1923, p. 517, 3 figs. Rapid determination of gas samples is featured in new instrument, called Ranarex recorder, which does not use chemicals or delicate electrical device.

CO_2 Tests. The Practical Utility and Limitations of CO_2 Tests, Chas. F. Wade. Practical Engr., vol. 67, no. 1885, Apr. 12, 1923, pp. 199-200. Discusses methods of flue-gas testing under three heads, viz., snap tests, tests of samples taken over an extended period, and continuous records; CO_2 bonus schemes.

Testing Apparatus. Automatic Flue-Gas Analysis. Power Engr., vol. 18, no. 206, May 1923, pp. 174-176, 6 figs. Comparatively novel forms of automatic apparatus for determination of various constituents in waste gases.

The Econometer CO_2 Tester. Engineering, vol. 115, no. 2991, Apr. 27, 1923, pp. 520-521, 2 figs. Describes new and very simple type of portable apparatus for testing amount of CO_2 in flue gases.

Unburned-Gas Determination. A Method of Determining Loss of Heat in Flue Gases Due to Incomplete Combustion, O. I. Hansen and K. E. Nielsen. Fuel in Sci. & Practice, vol. 2, no. 4, May 1923, pp. 115-120, 4 figs. Results of investigation conducted in Denmark show that new method of flue-gas analysis gives quick, reliable and, within limits of error of formula, exact determination of loss of heat due to unburned gases.

FLUIDS

Viscous, Stability of. Stability of a Viscous Liquid Contained between Two Rotating Cylinders, G. I. Taylor. Roy. Soc. Lond.—Philosophical Trans., vol. 223, no. A 612, 1923, pp. 289-343, 22 figs. Discusses special type of fluid instability and describes experiments in which results of analysis are subjected to numerical verification.

FLYING BOATS

Design. Some Notes on the Design, Construction and Operation of Flying Boats, J. D. Rennie. Roy. Aeronautical Soc.—Jl., vol. 27, no. 148, Apr., 1923, pp. 123-167 and (discussion) 168-181, 21 figs. Results of experience in flying-boat design obtained at Felixstowe and elsewhere and comparison of merits and demerits of other known types of hull construction with that developed there; various problems of design apart from hull.

FLYWHEELS

Explosions. Flywheel Explosions and Their Prevention, F. B. Tolsted. Tech. Eng. News, vol. 4, no. 2, May 1923, pp. 51 and 64. Limiting speeds for flywheels and pulleys; overloading and defects.

FORGING

Dies. Prolonging the Life of Forging Dies, Morgan Parker. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 671-674, 3 figs. Method of increasing resistance of steel to repeated shocks and resulting fatigue and crystallization.

Practice. Forgings and Smithwork. Metal Industry (Lond.), vol. 22, nos. 6, 7, 8, 9, 10 and 11, Feb. 9, 16, 23, Mar. 2, 9 and 16, 1923, pp. 131-132 and 133, 155-157, 177-180, 203-206, 231-232 and 259-261, 69 figs. Selection and testing of materials; forging methods; examination of typical class of smithwork; general problems of drop forging; production of forgings from iron and steel scrap; production of forgings from steel ingots, especially in respect to forgings made under hydraulic forging press; manufacture of chain cable.

FOUNDRIES

Automobile Castings. Sand and Molding for Automobile Castings, Henry M. Lane. Iron Age, vol. 111, no. 17, Apr. 26, 1923, pp. 1173-1176, 6 figs. Quantity production at plant of Wilson Foundry & Machine Co., Pontiac, Mich., aided by specially designed machinery.

Cost Accounting. Material Cost Accounting in a Foundry, F. C. Everitt and Johnson Heywood. Iron Age, vol. 111, no. 17, Apr. 26, 1923, pp. 1165-1169, 5 figs. Outline of procedure and blank forms suitable for small and large foundries.

Non-Ferrous Foundry Costing, H. Sheffield. Metal Industry (Lond.), vol. 22, no. 17, Apr. 27, 1923, pp. 419-421. Suggestions with regard to special needs of non-ferrous industry.

Sash-Weight Manufacture. New Method of Sash Weight Manufacture. Iron Age, vol. 111, no. 14, Apr. 5, 1923, pp. 963-964, 4 figs. Output of 3840 a day and molding cost of $1 per ton claimed; machine molding used; process is continuous.

FUELS

See BAGASSE; COAL; PULVERIZED COAL.

FURNACES

Linings. Fireproof Furnace Linings (Feuerung und feuerfestes Futtermaterial), Hirsch. Tonindustrie-Zeitung, vol. 47, nos. 19 and 20, Mar. 7 and 10, 1923, pp. 143-145 and 152-154, 12 figs. Properties of various types of refractories and their behavior on exposure to heat; melting points of coal and lignites; proper mortise for slag brick.

FURNACES, ANNEALING

Fuel Economy. Fuel Economy in Connection with Annealing Furnaces, Chas. F. Wade. Metal Industry (Lond.), vol. 22, no. 14, Apr. 6, 1923, pp. 332-333, 3 figs. Emphasizes need for reduction in amount of fuel consumed in furnace plant and shows how this may be effected by adopting improved methods of operation.

FURNACES, HOT-AIR

Design. Designing Furnace Systems for 140-Deg. Register Temperatures, V. S. Day. Sheet Metal Worker, vol. 14, no. 6, Apr. 13, 1923, pp. 202-203, 1 fig. Conditions to be met in designing gravity warm-air furnace installation to operate at maximum air temperature at 140 deg. at registers.

G

GAS ENGINES

Gas for. Gas for Use in Gas Engines, Johnstone Taylor. Power, vol. 57, no. 20, May 15, 1923, p. 753. Notes on comparative properties of gases tabulated for easy reference.

Large. Large Gas Engines, F. Johnstone Taylor. Gas & Oil Power, vol. 18, nos. 211, Apr. 5, 1923, pp. 109-110 and 115-116, and 125-128, 11 figs. Demonstrates value of large gas engines in reducing power production costs, and gives particulars of most recent design together with notes on suitable producer plants and figures relating to operating costs.

GAS PRODUCERS

British Practice. British Steelworks Gas-Producer Practice, Fred Clements. Iron & Steel Inst., advance paper, no. 6, for meeting May 1923, 15 pp., 15 figs. on supp. plates. Producer test data. Arrangement and details of testing apparatus; chemical and thermal balance sheets; schedules of producer practice; comparison of producer arrangements; general notes and definitions. See also (Abstract) in Engineering, vol. 115, no. 2993, May 11, 1923, pp. 597-599.

GASES

Entropy Diagrams. Entropy Diagrams for Gases (Le Diagramme d'Entropie des gaz), F. D'Espine. Chaleur et Industrie, vol. 4, no. 33, Jan. 1923, pp. 27-34, 4 figs. partly on supp. plate. Discusses simplification by Stadola.

Properties. Certain Noteworthy Properties of Gases (Ueber einige merkwurdige Eigenschaften der Gase), Friedrich Wachter. Zeit. fur technische Physik, vol. 4, no. 2, 1923, pp. 56-63. In an earlier publication, author referred to three properties of gaseous substances which had heretofore been little or not at all observed; in present article these phenomena are experimentally confirmed.

GEAR CUTTING

Rack-Cutting Machine. Rack-cutting, Franklin D. Jones. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 711-713, 5 figs. General practice in cutting racks on machines designed for this work.

GEARS

Marine-Turbine, Machining. Machining a Marine Turbine Gear Wheel. Machy. (Lond.), vol. 21, no. 547, Mar. 22, 1923, pp. 769-773, 10 figs. Practice of Wm. Beardmore & Co., Ltd., in machining large second-reduction or main gear wheel for marine turbine.

Pinions for. Calculation of Pinions for Gears (Note sur le calcul des pignons d'engrenages), Georges Prudon. Génie Civil, vol. 82, no. 16, Apr. 21, 1923, pp. 373-376, 5 figs.

Testing. Testing Machine Developed to Solve Gear Strength Problem, Wilfred Lewis. Automotive Industries, vol. 48, no. 18, May 3, 1923, pp. 974-978, 7 figs. Designed for use in determining increment load due to speed; will establish relationship between this load on one hand and tooth-form errors and mechanical properties of material on other; permits study of endurance and efficiency. Paper read before Am. Gear Mfrs. Assn.

Tooth Profiles. The Experimental Determination of Gear-tooth Profiles, Henry E. Merritt. Machy. (Lond.), vol. 21, no. 547, Mar. 22, 1923, pp. 778-780, 4 figs. Describes new process for generation of tooth sections.

GLASS

Heat-Resisting. Heat Resisting Glasses, W. E. S. Turner. Roy. Soc. Arts—Jl., vol. 71, no. 3675, Apr. 27, 1923, pp. 401-408 and (discussion) 408-412, 2 figs. Discusses attempts which have been made to improve heat-resisting power of glass, and forecasts possible developments.

GRINDING

Internal. Internal Grinding and Its Advantages, Frank W. Curtis. Am. Mach., vol. 58, no. 18, May 3, 1923, pp. 653-656, 8 figs. Grinding as means of producing precision parts; factors influencing internal grinding; types of machines; selection of grinding wheels.

GRINDING MACHINES

Centerless. Centerless Grinding Methods. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 721-724, 5 figs. Operations on Heim centerless grinding machine.

Spur-Gear. New Spur Gear Grinder Generates True Involute Tooth Curve. Automotive Industries, vol. 48, no. 18, May 3, 1923, pp. 968-969, 3 figs. Also capable of handling reasonable variations; can be used for pressure angles up to 25 deg.

Surface. Lumsden Twin-Table Surface Grinder. Engineering, vol. 115, no. 2989, Apr. 13, 1923, pp. 459-460, 6 figs. partly on p. 466. Vertical spindle surface grinder manufactured by Lumsden Machine Co.

H

HACK-SAWING MACHINES

Types. Making Modern Hack-Saw Big Production Factor, C. Norman Fletcher. Can. Machy., vol. 29, no. 19, May 10, 1923, pp. 19-21, 12 figs. Describes special-purpose machines, including tire, rail, pile, shaper, vertical, and plate-sawing machines.

HANGARS

Airplane, Reinforced-Concrete. Reinforced-Concrete Hangar for Airplanes, Constructed by the Aeronautical Department at Villacoublay [Hangar en béton armé, pour avions, construit pour le Service technique de l'Aéronautique, à Villacoublay (Seine-et-Oise)], André Lesage. Génie Civil, vol. 82, no. 10, Mar. 10, 1923, pp. 217-220, 13 figs. partly on supp. plate. Details of hangar and its equipment; two entrances, each 45 m. by 10 m., worked electrically; 3500 sq. m. of surface.

HARDNESS

Brinell Number, Variation with Load. The Variation of Brinell Hardness Number with Testing Load, Hugh O'Neill. Iron & Steel Inst., advance paper, no. 19, for meeting May 1923, 28 pp., 10 figs. Brinell number at low and ordinary loads; maximum Brinell number; tests on soft metals; tests on viscous materials; effect of cold work; theoretical considerations. Brinell and scleroscope hardness. Bibliography.

Study. A Contribution to the Study of Hardness, C. A. Edwards and Charles R. Austin. Iron & Steel Inst., advance paper, no. 9, for meeting May 1923, 18 pp., 7 figs. Determination of relationship existing between heights of fall and heights of rebound, heights of fall and volumes of indents produced, Brinell hardness numbers and rebounds obtained from falls that gave certain constant volume of indent; Brinell hardness numbers and rebounds obtained from constant height of fall.

HEAT TRANSMISSION

Dependence on Velocity. The Dependence of Heat Transmission on Velocity (Die Abhangigkeit des Warmeuberganges von der Geschwindigkeit), Wilhelm Nusselt. Stahl u. Eisen, vol. 43, no. 14, Apr. 5, 1923, pp. 458-462, 3 figs. Development of underlying principle; rapid mathematical solution; numerical examples; possibilities of different measurement of heating surfaces.

HEATING

Machine Shops. Three Different Methods of Heating a Large Machine Shop, James Mackay. Domestic Eng. (Chicago), vol. 102, no. 11, Mar. 17, 1923, pp. 557-560, 8 figs. Notes with illustrations showing various methods of heating machine shop of brick construction.

Testing Methods. Research Work on Practical Scientific Testing Methods in Heating (Relatives Forschen oder wissenschaftlich-praktische Versuchsverfahren in der Heizungstechnik), K. Brabbee. Gesundheits-Ingenieur, vol. 46, no. 16, Apr. 21, 1923, pp. 157-162, 15 figs. Methods of "absolute" measurement of efficiency of furnaces, heating and cooking apparatus, heat transmission, central heating boilers, calorific value of fuel, heat transmission of building materials, etc.

HEATING AND VENTILATION

Buildings. Heat Economics in Building Construction (Warmewirtschaft im Bauwesen), de Grahl. Bautechnik, vol. 1, no. 18, Apr. 27, 1923, pp. 171-174, 10 figs. Selection of building materials; heat transmission of building materials; insulation; central heating; position of radiators; etc.

Hospital. Heating and Ventilating Plant of a Kansas City Hospital, Walter E. Gillham. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 3, Apr. 1923, pp. 289-294, 5 figs. Oil-fired boilers supply steam for power and heating; exhaust ventilating fans in attic form main system for maintaining comfortable air conditions.

HEATING, HOT-AIR

Register Temperatures. Register Temperatures in Warm-Air Heating, V. S. Day. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 4, May 1923, pp. 367-369, 1 fig. Conditions to be met in designing gravity-furnace installation to operate at maximum air temperatures of 140 deg. at registers.

HEATING, HOT-WATER

Museum. Heating and Ventilating U. S. Museum, C. R. Denmark. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 2, Mar. 1923, pp. 87-99, 8 figs. Details of forced hot-water circulation and air-exhaust systems in new museum building of natural history, Washington, D. C.

HEATING, HOUSE

Fuel-Costs Comparison. House Heating with Gas, Coal and Oil, H. D. Valentine. Am. Gas Jl., vol. 118, no. 15, Apr. 14, 1923, pp. 310-313, 4 figs. A seasonal cost comparison. Paper read before Ill. Gas Assn.

HEATING, STEAM

District. District Heating Progress in Boston, D. S. Boyden. Am. Soc. Heating & Vent. Engrs.—Jl., vol. 29, no. 4, May 1923, pp. 355-365, 5 figs. Outline of equipment and rates with discussion of advantages and economics of production and distribution of steam service.

HOISTS

Electric. Calculation of Motor Performance in Elec-

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 140

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Shepard Elect. Crane & Hoist Co.
* Westinghouse Electric & Mfg. Co.

Motors, Synchronous
* Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Lunkenheimer Co.

Oil and Grease Guns
* Royersford Fdry. & Mach. Co.

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons Improved Equipment Co.
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Well Machinery
* Brownell Co.
* Ingersoll-Rand Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Oiling Devices
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oiling Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oils, Fuel
Texas Co.

Oils, Lubricating
Texas Co
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.
Link-Belt Co.

Ovens, Core
Whiting Corporation

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
Linde Air Products Co.

Packing, Ammonia
France Packing Co.
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Packing, Asbestos
* Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Packing Rubber
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
United States Rubber Co.

Packing Sheet
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Paints, Concrete (For Industrial Purposes)
Smooth-On Mfg. Co.

Paint, Metal
* General Electric Co.
* Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paper, Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
DuPont Engineering Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
Dixon, Joseph Crucible Co.
Keuffel & Esser Co.

Penstocks
Smith, S. Morgan Co.

Petroleum Products
Texas Co.

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* U. S. Cast Iron Pipe & Fdry. Co.

Pipe, Riveted
* American Spiral Pipe Wks.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe, Welded
* American Spiral Pipe Wks.
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Plate Metal Work
(See Steel Plate Construction)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Morse Chain Co.
* Poole Engrg. & Mch. Co.
* Royersford Fdry. & Mach. Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
Philadelphia Drying Machy. Co.

Presses, Foot
* Royersford Fdry. & Mach. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Machy. Co.

Presses, Punching and Trimming
Long & Allstatter Co.
* Royersford Fdry. & Mach. Co.

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machy. Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Machine Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. & Sons Co.

Pulleys, Iron
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
Kenworthy, Chas. F. (Inc.

Pulverizers
Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Outfits
Novo Engine Co.

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Raad Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
Midwest Engine Corp'n
* Morris Machine Works
* Nordberg Mfg. Co.
Novo Engine Co.
Taber Pump Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
Novo Engine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Deep Well, Axial
Midwest Engine Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked *appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

tric Hoists (Berechnung der Motorleistung für elektrisch betriebene Hebezeuge), M. Otto. Praktische Maschinen-Konstrukteur, vol. 56, no. 7–8 and 11–12, Feb. 23 and Mar. 23, 1923, pp. 72–73 and 103–105. Examples for traveling cranes, slewing cranes, etc.

HYDRAULIC TURBINES

Action of Water in. Action and Effect of Water in Turbines and Centrifugal Pumps (Die Art der Bewegung und Wirkung des Wassers in Turbinen und Kreiselpumpen). Danckwerts. Zentralblatt der Bauverwaltung, vol. 43, no. 25–26, Mar. 28, 1923, pp. 150–152, 11 figs. Discusses known formulas based on water-filament theory; comparative table giving data on axial, normal, low-speed, and high-speed turbines.

Francis. The Unit Values of Francis Turbines under Varying Conditions (Die Einheitsgrossen der Francisturbinen unter wechselnden Bedingungen), Georg Karrass. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 14, Apr. 7, 1923, pp. 346–348, 11 figs. Points out that unit values, especially specific speed, for given type of rotor, vary with coefficient of friction, discharge loss and inlet angles; these variations are calculated and curves plotted.

High-Speed Suction. Largest Low-Head Turbines Installed in Siphon Settings. Power, vol. 57, no. 21, May 22, 1923, pp. 784–788, 7 figs. Four turbines of high-speed suction type installed in siphon settings and equipped with hydraucone regainers, drive double generators. Installation at power house in Green Island, N. Y.

Machining Shafts. Making Shafts for Hydraulic Turbines. Howard Campbell. Am. Mach., vol. 58, no. 15, Apr. 12, 1923, pp. 557–558, 5 figs. Forging and machining operations on 24,000-hp. turbine shafts; inspection and assembly methods.

Testing Stations. Testing Station of Escher Wyss & Co., Zurich (Station d'essai de la Société Escher Wyss & Cie, Zurich), R. Dubs. Bul. Technique de la Suisse Romande, vol. 49, nos. 7 and 8, Mar. 31 and Apr. 14, 1923, pp. 77–83 and 89–91, 10 figs. Details of station at Ravensburg, Germany, for testing turbines of low head, and of station at Kapfnach, Switzerland, for turbines of high head, including their equipment.

HYDROELECTRIC DEVELOPMENTS

Hetch Hetchy, San Francisco. Hetch Hetchy Water Power Development, A. W. Copley. Power Plant Eng., vol. 27, no. 10, May 15, 1923, pp. 507–513, 11 figs. Details of project which will supply San Francisco with 400,000,000 gal. of water per day and develop 250,000 hp. Water wheels; generation units; transformer installation; transmission lines.

Priest Rapids, Wash. The Agricultural and Industrial Features of Priest Rapids (Wash.), Henry J. Pierce. Gen. Elec. Rev., vol. 26, no. 5, May 1923, pp. 291–294, 2 figs. Author shows vast possibilities for increased agricultural and industrial enterprises if largest hydroelectric project in the West is developed.

Tasmania. The Great Lake Hydro-Electric Power Scheme, Tas. Commonwealth Engr., vol. 10, no. 7, Feb. 1, 1923, pp. 241–245, 5 figs. Main points of scheme. Includes description of multiple-arch dam.

HYDROELECTRIC PLANTS

Automatic. Largest Automatic Hydro-Electric Station. Power, vol. 57, no. 21, May 22, 1923, p. 789, 2 figs. Describes plant of N. E. Power Co. at Searsburg, Vt., having capacity of 5000 kw. in single unit.

France. Hydraulic Energy of the Alps, the Central Plateau and the Pyrenees (Étude sur la compensation des energies hydrauliques des Alpes, du Plateau Central et des Pyrénées au moyen d'un reseau d'interconnexion à très haute tension, et de secours hydrauliques et thermiques), Ch. Duval and Ch. Lavauchy. Revue Générale de l'Electricité, vol. 13, no. 12, Mar. 24, 1923, pp. 479–487, 8 figs. Distribution of electric energy in France by a high-tension system; linking-up power stations of Alps, Central Plateau and Pyrenees.

The Bes Hydroelectric Plant [L'usine génératrice hydroclectrique du Bès près Saint-Chely d'Apcher (Lozere)] G. Lefèvre. Revue Générale de l'Electricité, vol. 13, no. 16, Apr. 21, 1923, pp. 659–672, 16 figs. General layout; installations for production and transformation of electric energy; transmission lines; stations.

Mexico. The Tuxpango Hydroelectric Plant of the Puebla Tramway, Light and Power Company (La planta hydroelectrica de Tuxpango de la Compañia de Tranvias, Luz y Fuerza de Puebla), Gavriel M. Oropesa. Revista Mexicana de Ingeniería y Arquitectura, vol. 1, no. 1, Mar. 15, 1923, pp. 21–31, 12 figs. On Rio Blanco; barrage dams, pressure conduits, transmission lines and poles, turbo-generators and general electric equipment.

I

ICE MANUFACTURE

Water Treatment. Lime is Basis of Water Treatment for Ice Making. Power Plant Eng., vol. 27, no. 10, May 15, 1923, pp. 535–537. Includes table showing effect on ice of various minerals contained in water and how they are eliminated.

ICE PLANTS

Brine Tanks. Some Notes on Freezing Tank Design, H. I. Lewis. Refrig. Eng., vol. 9, no. 10, Apr. 1923, pp. 301–306, 8 figs. Heat transfer in brine tank is said to be very much dependent upon hydraulics thereof; by proper attention to fundamentals of fluid flow, heat-transferring capacity of apparatus within tank can be greatly increased.

Raw-Water. Kosmos Ice Plant Is Electrically Operated. Power Plant Eng., vol. 27, no. 9, May 1, 1923, pp. 455–460, 10 figs. Raw-water ice plant in Chicago installs water-softening system to reduce core-pumping costs.

IGNITION

Electric Systems. Electrical Ignition Systems, A. P. Young. Beama, vol. 12, nos. 59 and 60, Mar. and Apr. 1923, pp. 148–157 and 235–244, 37 figs. Mar.: Describes hot-wire, break-spark, trembler coil, and jump-spark ignition. Apr.: Relation to high-tension magneto. British magneto industry. Bibliography.

IMPACT TESTING

Izod Test. The Izod Impact Test, J. H. Andrew and Robert Hay. West of Scotland Iron & Steel Inst.—Jl., vol. 30, part 4, Jan., session 1922–23, pp. 48–51 and (discussion) 51–53, 11 figs. on supp. plate. Results of experiments on carbon steels low in manganese.

Metals. Some Experiments on Impacts, Junzô Okubo. Tôhoku Imperial University—Sci. Reports, vol. 11, no. 6, Dec. 1922, pp. 455–461, 4 figs. Results of author's observations on impact phenomena and conclusions regarding mechanical properties of metals based on experimental data.

INDICATORS

Hydraulic Pressure. Hydraulic Pressure Indicator, John N. Siousssa. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 708, 1 fig. Device for determining pressures of more than 100,000 lb. per sq. in.

INDUSTRIAL MANAGEMENT

Engineering Department. The Successful Operation of an Engineering Department, W. E. Trish. Indus. Management (N. Y.), vol. 65, no. 5, May 1923, pp. 292–299. The engineer's pay.

Factory Rules. Framing Works Rules, Eric N. Simons. Indus. Management (Lond.), vol. 9, no. 8, Apr. 19, 1923, pp. 233–235. Author demonstrates advisability of drawing up comprehensive set of regulations for observance in factory or works.

Paper Industry. Management Engineering in the Paper Industry, R. B. Wolf. Mech. Eng., vol. 45, no. 5, May 1923, pp. 295–296. Measurement of performance a factor in good management; points out that industry should be organized to encourage rather than repress individual development.

Planning Department. The Planning Department, J. Knowles. Indus. Management (Lond.), vol. 9, nos. 7 and 9, Apr. 5 and 19, 1923, pp. 199–201 and 228–230, 7 figs. Practical advice on organization of this department, and examples of works records in common use.

Progress. The Management Movement, Richard H. Lansburgh. Taylor Soc.—Bul., vol. 8, no. 2, Apr. 1923, pp. 46–52. The work of Frederick W. Taylor and growth of management movement; effect of war in changing operating methods in American industry; interest of public is considered best criterion for continued growth of management movement.

Taylor System. Notes on the Taylor System (Remarques sur les méthodes de Taylor), H. Pillet Arts et Métiers, vol. 75, no. 27, Dec. 1922, pp. 361–366, 3 figs.

Time Study. See TIME STUDY.

INDUSTRIAL RELATIONS

Improvement in. Is There Enough Leadership in Management Today? A. B. Farquhar. Factory, vol. 30, no. 5, May 1923, pp. 535–537. In author's opinion, change that has come in status of employer and employed is not to be deplored; points way toward even better relations in future.

INTERNAL-COMBUSTION ENGINES

Two-Stroke, Development of. Development of the Two-Stroke Engine (Zur Weiterentwicklung des Zweitaktmotores), Curt Hanfland. Motor u. Auto, vol. 20, no. 6, Mar. 25, 1923, pp. 42–44, 3 figs. Discusses two-channel and three-channel systems of construction; 2-stroke engines with rotary compressors; comparison with 4-stroke engine.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; MOTOR TRUCKS, ENGINES.]

IRON

Chromizing. Chromizing, F. C. Kelley. Am. Electrochem. Soc. advance paper, no. 19, for meeting May 7, 1923, pp. 233–250, 8 figs. Summary of work done on diffusion of metals in solid state; process of chromizing and its effects upon physical and chemical properties of iron; practical application of process.

Grain Growth. Some Experiments on Grain Growth in Iron and Steel, L. E. Benson and F. C. Thompson. Iron & Steel Inst., advance paper, no. 4, for meeting May 1923, 19 pp., 14 figs. Investigation of crystal growth during annealing in ferrous materials; work is confined to temperatures not exceeding 800 dec. cent. and deals with influence of composition only so far as carbon and manganese are concerned.

Gray, Graphite in. Graphite Controls Gray Iron, J. W. Bolton. Foundry, vol. 51, no. 10, May 15, 1923, pp. 405–407, 12 figs. Points out that size of flakes influences quality; high-carbon sometimes stronger than lower-carbon irons; need shown of standard testing methods and research on fundamental principles. Paper read before Am. Foundrymen's Assn.

IRON ALLOYS

Electrochemical Behavior. Electrochemical Behavior of Alloys of Iron With Chromium, Iron With Molybdenum and Iron With Aluminum (Ueber das elektrochemische Verhalten der Legierungen des Eisens mit Chrom, des Eisens mit Molybdän und des Eisens mit Aluminium), G. Tammann and E. Sotter. Zeit. des anorganische u. allgemeine Chemie, vol. 127, no. 3, Mar. 23, 1923, pp. 257–272, 10 figs. Discusses anodic and cathodic passivity and attempts an explanation.

Iron-Carbon-Silicon. On the Structural Constitution of Iron-Carbon-Silicon Alloys, Kôtarô Honda and Takejiro Murakami. Iron & Steel Inst., advance paper, no. 13, for meeting May 1923, 39 pp., 29 figs. Equilibrium diagram; thermal and magnetic analysis; thermal expansion at high temperature; structural constitution; microscopic investigation.

Iron-Nickel. The Constitution of the Alloys of Iron and Nickel, D. Hanson and J. R. Freeman, Jr. Iron & Steel Inst., advance paper, no. 11, for meeting May 1923, 14 pp., 6 figs. Research undertaken at Nat. Physical Laboratory. Determination of constitution of alloys up to their melting points.

IRON AND STEEL

Corrosion. Corrosion of Rustproofed Iron and Steel, W. P. Wood. Chem. & Met. Eng., vol. 28, no. 17, Apr. 30, 1923, pp. 769–772, 1 fig. Galvanizing said to be best method of protecting against rusting when immersed in fresh water saturated with oxygen; uncoated iron and low-carbon steel corrode at about equal rates under those conditions.

Production and Consumption. Iron Ore, Pig Iron and Steel in 1921, Ernest F. Burchard and Hubert W. Davis. U. S. Geological Survey, no. 1-30, Apr. 23, 1923, pp. 565–597, 4 figs. Quantities of iron ore mined and shipped; total output, principal mines, and prices per ton of iron ore; iron ore mining developments; foreign trade in iron ore; production of iron ore by countries; production, shipments, and prices of pig iron; blast furnaces for pig iron; imports and exports of ferroalloys; production and foreign trade in steel.

IRON CASTINGS

Automotive. Studies Automotive Castings, H. B. Swan. Foundry, vol. 51, no. 10, May 15, 1923, pp. 414–418, 4 tables. Data collected and compiled shows variations in constituents of metal used by different manufacturers; total carbon content governed by height of bed; steel additions do not lower it. Paper presented before Am. Foundrymen's Assn.

Feeding Heads. Facts about Sound Castings, Feeding Heads, Runners and Venting, E. V. Ronceray. Foundry Trade Jl., vol. 27, no. 347, Apr. 12, 1923, pp. 289–294, 12 figs. Results of author's experience in past year. Leonard's experiments; O. Smalley's researches. See also (discussion), no. 349, Apr. 26, 1923, pp. 336–340, 3 figs.

Foundry Methods. Castings Given Pressure Test, H. E. Diller. Foundry, vol. 51, no. 9, May 1, 1923, pp. 354–362, 19 figs. Complicated work made airtight by skillful method of gating and judicious use of risers. Describes procedure of foundry making light and medium gray-iron and semi-steel castings of every description.

Gray-Iron. Compares Practice in Gray Iron, H. B. Swan. Iron Trade Rev., vol. 72, no. 20, May 17, 1923, pp. 1455–1458. Data on automotive castings compiled from questionnaires returned by 16 plants; for engine cylinders scrap steel of fairly good section, such as rails, produces best results. (Abstract.) Paper read before Am. Foundrymen's Assn.

Manufacturing Gray Iron Castings at the Plant of the Best Steel Casting Company, C. A. Handschin. West. Machy. World, vol. 14, no. 4, Apr. 1923, pp. 123–125, 9 figs. Description of methods and equipment used in different departments.

IRON, PIG

Constituent Elements. How the Constituent Elements of Pig Iron Are Determined. Raw Material, vol. 5, no. 11, Dec. 1922, pp. 420–423 and vol. 6, no. 1, Jan. 1923, pp. 15–16. Methods of chemists of U. S. Steel Corp. for sampling and analysis of pig iron. Dec.: Determination of silicon and sulphur. Jan. Phosphorus.

J

JIGS

Bushings for. Standard Jig Bushings. Am. Mach., vol. 58, no. 17, Apr. 26, 1923, pp. 625–626, 5 figs. System known as Briney standard comprises both liner and wearing bushings; locking method requires use of neither screws nor pins. Data as to range of sizes together with all dimensions.

L

LABOR

Bibliography. Publications Relating to Labor. Monthly Labor Rev., vol. 16, nos. 2, 3 and 4, Feb., Mar. and Apr. 1923, pp. 272–278, 179–188 and 188–193. Official publications, United States and foreign countries, and unofficial publications.

Wages and Hours Wages and Hours of Labor. Monthly Labor Rev., vol. 16, no. 2, Feb. 1923, pp. 132–165. Wage rates on American and foreign cargo steamships, 1922. International comparison

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 140

Pumps, Filter Press
Buffalo Steam Pump Co.
* Goulds Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.

Pumps, Hydraulic
American Fluid Motors Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring
Wayne Tank & Pump Co.

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Pumps, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lunkenheimer Co.
Novo Engine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Oil (Hand)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Divsion)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
Novo Engine Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Novo Engine Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Smidth, F. L. & Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Morris Machine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Punches, Metal Hand (Power)
* Parker-Kalon Corp'n

Punches, Multiple
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Punches, Power
* Royersford Fdry. & Mch. Co.

Punches and Dies
* Royersford Fdry. & Mch. Co.

Punching and Coping Machines
Long & Allstatter Co.

Punching and Shearing Machines
Long & Allstatter Co.
* Royersford Fdry. & Mch. Co.

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Elliott Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Superheater Co.
Taylor Instrument Cos.

Pyrometers, Optical
Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co.

Pyrometers, Radiation
Taylor Instrument Cos.

Racks, Machine, Cut
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Railways, Industrial
Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recorders, CO
* Uehling Instrument Co.

Recorders, CO_2
* Uehling Instrument Co.

Recorders, SO_2
* Uehling Instrument Co.

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Nordberg Mfg. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Blower
* Davis, G. M. Regulator Co.

Regulators, Damper
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Parker-Kalon Corp'n

Regulators, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Feed Water
* Edward Valve & Mfg. Co.
Elliott Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Humidity
* Fulton Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Fulton Co.
* General Electric Co.
* Kieley & Mueller (Inc.)
Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
Taylor Instrument Cos.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
Long & Allstatter Co.

Roller Bearings
(See Bearings, Roller)

Rolling Mill Machinery
Mackintosh-Hemphill Co.

Rolls, Crushing
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Rolls, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
* Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
* Johns-Manville (Inc.)

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope Drives
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rubber Goods, Mechanical
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
United States Rubber Co.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Saw Rigs, Portable
Novo Engine Co.

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Water Intake (Traveling)
Chain Belt Co.
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Drive (Hardened)
* Parker-Kalon Corp'n

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker-Kalon Corp'n

Screws, Set
Allen Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Machy. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Co.

Shafting, Flexible
* Gwilliam Co.

Shafting, Turned and Polished
Cumberland Steel Co.
Link-Belt Co.

Shapes, Brick
McLeod & Henry Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Shears, Alligator
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Shears, Plate
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Sheaves, Rope
Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Nordberg Mfg. Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Sheets, Rubber, Hard
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Shelving, Metal
Manufacturing Equip. & Engrg. Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp Wm. & Sons Ships & Engine Bldg. Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

of real wages. **Wages and hours of labor in Australia**; Belgian coal mines; Canada; Hamburg, Germany; British railway service. Leave with pay in British industries. Wages of European workers in S. Africa.

Wages and Hours of Labor. Monthly Labor Rev., vol. 16, nos. 3 and 4, Mar. and Apr. 1923, pp. 48–54 and 56–70. Mar.: Wages and hours of labor in tin-plate mills in 1922; salaries of factory office employees in New York State, 1914 to 1922. Apr.: Wages and hours of labor in automobile industry, and in sheet mills, 1922; termination of eight-hour working-day agreement in Denmark and of agreements in Norway; wages in leather and printing industries in Paris, 1922; production and wages in German steel works, 1913 to 1921; working hours and production in British engineering and shipbuilding industries.

LATHES

Countershafts. Lathe Countershafts, Hubert Bentley. Mech. World, vol. 73, no. 1892, Apr. 6, 1923, pp. 210–211, 6 figs. Considers various pulley arrangements applicable to one- and two-speed countershafts and reversing countershafts, together with mechanism for appropriately shifting belt from fast to loose pulley, and vice-versa.

LIQUIDS

Weighing Meter. A New Weighing Meter for Liquids. Power, vol. 57, no. 19, May 8, 1923, p. 720, 2 figs. Describes Cochrane weighing meter for automatically weighing condensate, feedwater, etc.

LOCOMOTIVE BOILERS

Flue Expanders. Types of Flue Expanders Used in British Shops. A. Wrench. Boiler Maker, vol. 23, no. 4, Apr. 1923, pp. 91–92, 8 figs. Enumerates several types of tube expanders used in England for locomotive boilers; roller type almost exclusively used.

Water Circulation. Locomotive Boiler Water Circulation. C. A. Seley. Southern & Southwest Ry. Club—Proc., vol. 17, no. 2, Mar. 1923, pp. 10, 13–14, 17–18, 21–22 and 25 and (discussion) 25–26, 29–30 and 33–34, 2 figs. Also Ry. Mech. Engr., vol. 97, no. 5, May 1923, pp. 274–275. Details of Nicholson thermic siphon which can be applied to firebox of any locomotive, and functions which it will perform.

LOCOMOTIVES

Crossheads. Unique Type of Crosshead for Heavy Locomotives. Ry. Mech. Engr., vol. 97, no. 5, May 1923, pp. 268–270, 6 figs. After extended experiments Pa. R. R. adopts crosshead with large bearings which greatly increase durability.

Decapod Freight. Moving 6,700 Cars Daily Over the Alleghenies. Ry. Age, vol. 74, no. 22, May 5, 1923, pp. 1089–1093, 6 figs. Difficult operating conditions on Pennsylvania R. R. system met by Decapod freight locomotives. Comparative cost of operation with Mikados and Decapods.

Design. As to the Locomotive, What Next? G. M. Basford. Jl. Pac. Ry. Club—Proc., vol. 6, no. 12, Mar. 1923, pp. 7, 9, 11, 13, 15, 17, 19–32 and (discussion) 32–35, 6 figs. Notes on locomotive coordination factors; problems of design, dealing with superheaters, feedwater heaters, mechanical stokers, improved valve motion, water purification, steam separators, lubrication, boosters, ashpans, grates, etc.; threatening limit to locomotive progress.

Freight. New 2-6-0 Type Engines for the Dublin & South Eastern Railway. Ry. Gaz., vol. 38, no. 14, Apr. 6, 1923, p. 555, 1 fig. New class of freight engines.

Fuel Consumption. Fuel Consumption in Locomotive Operation (Betrachtungen uber den Brennstoffverbrauch im Lokomotivbetriebe), R. Sanzin. Organ fur die Fortschritte des Eisenbahnwesens, vol. 78, no. 1, Jan. 15, 1923, pp. 1–10, 3 figs. Results of tests showing, by means of tables and curves, optimum for given locomotives, i.e., maximum load and speed with minimum fuel consumption; express passenger and freight locomotives.

Improvement Possibilities. Possibilities of Increased Efficiency in Railway Locomotives. T. Grime. North-East Coast Instn. Engrs. & Shipbldrs., advance paper for meeting Apr. 20, 1923, 21 pp., 5 figs. Thermal efficiency of steam locomotive; developments which may be expected in construction of condensing steam locomotives, electrification of railways, and development of internal-combustion engine. Appendix presents records of results attained in actual practice on various railways.

Mikado. A 3-Cylinder Mikado—Newest German Type. Ry. Rev., vol. 72, no. 18, May 5, 1923, pp. 757–760, 6 figs. 11,000th locomotive built by A. Borsig indicates rapid development in construction and design; details of standardized Mikado.

Steam Production and Use. Economic Production and Use of Steam on Locomotives. Int. Ry. Congress Assn.—Bul., vol. 5, no. 4, Apr. 1923, pp. 292–328, 3 figs. Discussion on superheating of steam, compounding, heating feedwater, and special devices, including water-tube boilers, etc. Also includes following articles: Development of Steam Locomotive in North America, by G. L. Bourne; Apparatus for Bringing Coal Forward on Locomotive Tenders, Halla-Haken System, by Paul Koller; Note on Hot Water Washing Out Plant at Locomotive Shed at St. Lorenzo, Rome, by R. Cassinis.

Steam-Turbine Locomotives with Condensing Turbines (Dampflokomotiven mit Kondensation), Rudolf Lorenz. Glasers Annalen, vol. 92, no. 5, Mar. 1, 1923, pp. 69–79, 4 figs. Study of characteristic features of turbine locomotives, particularly in regard to fuel consumption in comparison with piston and electric locomotives.

Trucks, Axles, and Springs. Bogies (Trucks), Axles and Springs of Locomotives. Int. Ry. Congress Assn.—Bul., vol. 5, no. 4, Apr. 1923, pp. 329–343. Discussion on best arrangement of bogies, axles and springs of locomotives, especially of locomotives for high speeds, with long wheelbases, so as to facilitate running round curves and to insure proper stability of engines.

Valve Gears. Graphical Kinematics in the Construction of Stephenson Links for Locomotives with Poppet Valve Gear (Zeichnende Kinematik im Bau von Kulissensteuerungen für Lokomotiven mit Ventilsteuerung), Rudolf Langner. Glasers Annalen, vol. 92, no. 7, Apr. 1, 1923, pp. 101–105, 7 figs. Method of determining, from initial speed of driving-crank and flycrank pin, speed and acceleration of point connected with valve-gear shaft.

The Walschaert Gear Adapted to Inside Cylinder Locomotives. Engineering, vol. 115, no. 2993, May 11, 1923, pp. 596–597, 3 figs. Recent adaptation of gear to inside-cylinder engine.

LUBRICANTS

Grease. Grease: Its Manufacture and Usage. Lubrication, vol. 9, no. 3, Mar. 1923, pp. 25–30. Properties grease should possess; advantages and disadvantages of grease as lubricant; where and when to use grease; manufacture of cup, sponge, rosin, and railroad greases.

LUBRICATING OILS

Manufacture and Application. Lubricants, Their Manufacture, Testing and Application (Schmiermittel, ihre Herstellung, Prüfung und Verwendung), Georg Wolff. Praktische Maschinen-Konstrukteur, vol. 56, no. 9–10, Mar. 9, 1923, pp. 87–89. Discusses various types of lubricating oils, their properties, viscosity, flash-point, etc., and their behavior in lubrication.

Tests. Testing the Quality of Lubricating Oils, Winslow H. Herschel.—Engrs.' Soc. West. Pa.—Proc., vol. 38, no. 10, Jan. 1923, pp. 503–518 and (discussion) 519–541, 1 fig. Of tests in general use, gravity is necessary to determine absolute viscosity; fire and flashpoints are inadequate substitutes for evaporation test or fractional distillation; and pour point and viscosity determine suitability but not quality. Bibliography.

Viscosity. Viscosity of Lubricating Oils at High Pressures. Mech. Eng., vol. 45, no. 5, May 1923, p. 315. Progress report of special research committee on lubrication.

M

MAGNESIUM ALLOYS

Electron Metal. Electron Metal (Le metal electron), H. Kalpers. Fonderie Moderne, vol. 17, Mar. 1923, pp. 74–76, 1 fig. Contains 80 per cent magnesium, plus zinc, etc.; foundry sand and its preparation.

MALLEABLE CASTINGS

Failures. Some Failures in Malleable Castings, F. H. Herren. Foundry Trade Jl., vol. 27, no. 347, Apr. 12, 1923, pp. 295–297 and (discussion) 297–298. Time losses in experimenting in author's firm; possible variations; metallurgical failures; skin defects; draws; fragile castings; hard spots from grinding; failures from cans; effect of silicon, etc.

MALLEABLE IRON

Melting. Melting Small Lots of Malleable Iron, S. J. Felton. Iron Trade Rev., vol. 72, no. 18, May 3, 1923, pp. 1302–1303. Discussion based on use of 500- and 1000-lb., horizontal, barrel-type, non-crucible, tilting furnaces using oil as fuel. (Abstract.) Paper read before Am. Foundrymen's Assn.

Production. Notes on Malleable Iron Production, W. H. Poole. Foundry Trade Jl., vol. 27, nos. 348 and 349, Apr. 19 and 26, 1923, pp. 309–311 and 329–331, 13 figs. Deals essentially with Reaumur-type malleable iron, generally known as white-heart malleable.

MANOMETERS

Liquid. New Liquid Manometers and Their Application to Heating and Ventilation (Neue Flussigkeitsmanometer und deren Anwendung in der Heizungs- und Luftungstechnik), E. Nickel. Feuerungstechnik, vol. 11, no. 12, Mar. 15, 1923, pp. 137–140, 7 figs. Describes improvements in that type of manometer which, through inclined position of measuring tube, gives magnification of relatively low pressures.

MATERIALS

Strength-Weight Factors. Material Selection Should Be Based on Strength-Weight Factors, Horace C. Knerr. Automotive Industries, vol. 48, no. 16, Apr. 19, 1923, pp. 868–872. Use of strength-weight factors in comparing materials; presents tables of strength-weight factors of metals; wood; rope, cable, thread, etc.; fabric, paper, etc.; and miscellaneous materials.

MEASUREMENTS

Length. Industrial Length Measures (La loi des longueurs industrielles), F. Bayle. Technique Moderne, vol. 15, nos. 5, 6 and 7, Mar. 1, 15 and Apr. 1, 1923, pp. 129–134, 165–169 and 209–211, 7 figs. Necessity for standardization; principles of standardization; units of length; national and international law for length measure; advantages of a universal length measure.

METAL DRAWING

Power Required. Power Required for Drawing Metal (Kraftbedarf zum Ziehen), Hermann Jäger. Werkstattstechnik, vol. 17, no. 7, Apr. 1, 1923, pp. 193–197, 8 figs. Mechanics of producing iron and steel rods by drawing through a die; deformation of metal in process of drawing; calculation of strains and stresses; drawing-power formulas.

METALS

Calorizing. Minimizing Heat Oxidation of Metals Power Engr., vol. 18, no. 204, Mar. 1923, pp. 95–96, 3 figs. Points out that very definite economies in replacement of metal parts subjected to heat are possible by their treatment by calorizing process.

Crystallization. A Note on the Systems in Which Metals Crystallise, John L. Haughton and G. Winifred Ford. Faraday Soc.—Trans., vol. 18, part 1, no. 52, Oct. 1922, pp. 112–118, 2 figs. It is shown that in most cases system in which metal crystallizes is dependent on its position in periodic table; in nearly every case, alloys which form homogeneous series of solid solutions right across diagram crystallize in same system.

Deformation. Permanent Deformation of Metals (Sur les deformations permanentes des métaux), A. H. Leblond. Revue de Métallurgie, vol. 20, no. 4, Apr. 1923, pp. 250–256, 10 figs. Results of experiments with various metals strained beyond their elastic limit.

Failure. Failures of Engineering Components and their Causes. Machy. (Lond.), vol. 21, no. 547, Mar. 22, 1923, pp. 785–788, 8 figs. Bulk of failures due to some fault in metal or alloy of which component is made. Causes of failure from a metallurgical standpoint and how they can be prevented in future.

Fatigue. An Investigation of the Fatigue of Metals, Series of 1922, H. F. Moore and T. M. Jasper. University of Ill. Bull., vol. 20, no. 37, May 14, 1923, 97 pp., 45 figs. Investigation by Eng. Experiment Station of University. Endurance limit for wrought ferrous metals under reversed stress; miscellaneous tests and results; resistance to repeated stress other than reversed stress; unsolved problems; testing machine for tests of metals under reversed bending.

Degree of Stress, Size of Grain, and Temperature in Connection with Fatigue Phenomena (Beanspruchungshohe, Korngrosse und Temperatur bei Ermudungserscheinungen), W. Muller and Hugo Leber. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 15, Apr. 14, 1923, 357–363, 14 figs. Influence of stress on fatigue quality of materials development of fatigue fractures; influence of grain size and of increased temperature.

Mechanically Stressed, Behavior of. The Behavior of Mechanically Stressed Metals (Das Verhalten mechanische beanspruchter Metalle), E. Honegger. Eisenbau, vol. 13, nos. 3, 4 and 5, Mar. 17, Apr. 21 and May 16, 1922, pp. 47–51, 77–89 and 95–100, 22 figs. Life of various elements of machines and structures; static problems; experimental investigation of deformations and distribution of stress; fracture; X-ray examination. Bibliography.

Stainless. Stainless Metals, J. Kent Smith. Metal Industry (Lond.), vol. 22, no. 15, Apr. 13, 1923, pp. 371–372. Experiments toward prevention of rust and corrosion; nature of stainless metals; possibilities.

Temperature Effect on Strength. The Influence of Temperature on the Strength of Material. Mar. Engr. & Naval Architect, vol. 46, no. 547, Apr. 1923, pp. 125–126 and 137, 1 fig. Deterioration of metal and reduction of strength, due to continuous application of high temperatures, in internal-combustion turbine; increase of working temperatures of modern prime mover.

MILLING CUTTERS

Manufacture and Uses. Milling Cutters, Their Production and Use (Fräswerkzeuge, ihre Herstellung und Verwendung), W. Schumann. Praktische Maschinen-Konstrukteur, vol. 56, nos. 7–8 and 11–12, Feb. 23 and Mar. 23, 1923, pp. 67–71 and 99–103, 35 figs. Discusses various types; profiles; forms for production of shapes; types of cutting edges, gear-hobbing machines.

MILLING MACHINES

Automatic. Cincinnati 48-Inch Worm-Driven Automatic Milling Machine. Am. Mach., vol. 58, no. 18, May 3, 1923, pp. 645–648, 9 figs. Worm drive on spindle is feature; made in duplex, widened duplex and plain models; single-pulley drive and intermittent feed; examples of work done.

Plate-Scarfing. Double-headed Milling Machine for Scarfing Plates. Engineer, vol. 135, no. 3512, Apr. 20, 1923, p. 418, 3 figs. Machine for performing scarfing of plates used in manufacture of steel pipe lines.

MOTOR BUSES

Clydesdale. Clydesdale Designs Special Bus. Motor Transport (N. Y.), vol. 28, no. 7, May 1, 1923, pp. 172–174, 7 figs. Chassis can be adapted for any body; 4-wheel brakes; capacity 12 to 25 passengers; 6-cylinder 70-b.hp. at 2200 r.p.m. engine.

Lancia. The Lancia Coach. Motor Transport, vol. 36, no. 945, Apr. 9, 1923, pp. 445–447, 11 figs. Details of 20-seater vehicle designed to provide travelling comport of high-class light car; 35-hp. four-cylinder monobloc type engine.

MOTOR-TRUCK TRANSPORTATION

Comparison with Railways. Operating Costs for a 5-Ton Motor Truck Compared to Cost of Transportation by Horse-Drawn Trucks and Railways (Betriebskostenaufstellung für einen 5-Tonnen-Lastkraftwagen, gegenübergestellt den Unkosten bei Beförderung der Güter durch Pferdegespanne und Eisenbahn), S. Kleczewer. Motorwagen, vol. 26, no. 8, Mar. 20, 1923, pp. 118–119. Comparative tables, showing savings effected by motor-truck transportation.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 149

DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co
Lammert & Mann Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* Cleveland Worm & Gear Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Poole Engrg. & Mch. Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Fuller-Lehigh Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.

Steel, Cold Rolled
Cumberland Steel Co.
* Union Drawn Steel Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Falk Corporation
* Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
* Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Keeler, E. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Stokers, Chain Grate
* Babcock & Wilcox Co
* Combustion Engineering Corp'n
Green Engineering Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Overfeed
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Switches, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Synchronous Converters
(See Converters, Synchronous)

Synchroscopes
Weston Electrical Instrument Co.

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Tachometers
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Tachoscopes
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Tanks, Acid
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
* Graver Corp'n
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Machinery
* Franklin Machine Co.

Thermometers
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Thermometers, Distance
Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.

Thermostats
* Bristol Co.
* Fulton Co.
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co. (Inc.)

Tie Tamping Outfits
* Ingersoll-Rand Co.

Time Recorders
* Bristol Co.

Tipples, Steel
Link-Belt Co.

Tongs, Crane
Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Machinists' Small
* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
DuPont Engineering Co.

Torches, Hand
* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tractors, Industrial (Storage Battery)
Yale & Towne Mfg. Co.

Tractors, Turntable
Whiting Corp'n

Trailers, Industrial
Yale & Towne Mfg. Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
Whiting Corp'n

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Transmissions, Variable Speed
American Fluid Motors Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Treads, Stair (Rubber)
United States Rubber Co.

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n
Whiting Corp'n

Trucks, Industrial (Storage Battery)
Yale & Towne Mfg. Co.

Trucks, Trailer
Yale & Towne Mfg. Co.

Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.

Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Tubing, Rubber (Hard)
* Goodrich, B. F. Rubber Co.

Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mch. Co.
Whiting Corp'n

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy. Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Elec. & Mfg. Co.

Turbo-Blowers
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Turbo-Compressors
* Ingersoll-Rand Co.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Electric & Mfg. Co.

Turbo-Pumps
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

Turntables
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Railway Terminals. English Cartage-Practice a Standard for Our Railway-Terminal Trucking. F. C. Horner. Soc. Automotive Engrs.—Jl., vol. 12, no. 5, May 1923, pp. 437–445, 6 figs. Discusses English system under two main divisions of delivery and collection; outlines field for motor truck in railway-terminal service; merits and demerits of unit containers; English "flats," or demountable bodies.

MOTOR TRUCKS

Albion. A New 30-Cwt. Lorry. Engineer, vol. 135, no. 3513, Apr. 27, 1923, pp. 452–453, 4 figs. Details of gasoline trucks constructed by Albion Motor Car Co.

American-LaFrance. American-LaFrance Makes Own Units for New Line of Trucks. Herbert Chase. Automotive Industries, vol. 48, no. 17, Apr. 26, 1923, pp. 916–929, 5 figs. Designs follow conventional practices but incorporate several novel details; features include self-aligning multiple-disk clutch, simple design of governor, counterbalanced crankshaft and wick-oiled knuckle.

American-La France 3½- and 5-Ton Trucks Newcomers in Field. Motor Transport (N. Y.), vol. 28, no. 6, Apr. 15, 1923, pp. 143–146, 9 figs. Detailed description of design of motor trucks produced by fire-apparatus manufacturer.

Development. What Is Right with the Motor Truck Industry. Stephen G. Thompson. Soc. Automotive Engrs.—Jl., vol. 12, no. 5, May 1923, pp. 446–448. Author presents statistical data showing that there is nothing fundamentally wrong with motor-truck industry.

Engines. Development of American Motor Truck Construction (Die Entwicklung des amerikanischen Lastwagenbaues). J. Storch. Motor u. Auto, vol. 20, nos. 5 and 6, Mar. 10 and 25, 1923, pp. 31–32 and 39–42, 8 figs. Describes various types of engines for motor trucks and buses, including those of Midwest Engine Co., Wisconsin Motor Mfg. Co., Hercules Motor Mfg. Co., Waukesha Motor Co., Continental Motors Corp., and others.

Operating Costs. Truck Operating Costs. Ben H. Petty. Purdue University Eng. Experiment Station—Bul. no. 10, vol. 7, no. 1, Feb. 1923, 44 pp., 13 figs. Development of motor-truck transportation; motor truck vs. railroad; failures; items considered in cost system; relative importance of cost items; analysis of factors governing motor-truck operating costs; systems for recording operating cost data—National standard truck-cost system. Bibliography.

Steam. Steaming Up 1 in 4½. Motor Transport, vol. 36, no. 947, Apr. 23, 1923, pp. 498–499, 3 figs. Details of new 6-ton Mann truck and test made; normal consumption figures.

The Super-Sentinel. Motor Transport (Lond.), vol. 36, no. 946, Apr. 16, 1923, pp. 469–472, 7 figs. Details of 6-ton steam truck, manufactured by Sentinel Waggon Works, Ltd., Shrewsbury, Eng., driven by side chains; new design of steam generator.

MOTORCYCLES

Manufacture. Methods in a Motor-cycle Factory. Machy. (Lond.), vol. 22, nos. 552 and 553, Apr. 26 and May 3, 1923, pp. 101–106, and 133–136, 19 figs. Review of practice of A. J. Stevens, Ltd., Wolverhampton. Operations on cylinders and crankcases; building cycle frames; enameling and rustproofing; coslettizing process.

O

OPEN-HEARTH FURNACES

Improvements. Progress in Martin Steel Works (Les progres réalisés dans les aciéres Martin). A. Berberot. Revue de Métallurgie, vol. 20, nos. 1 and 2, Jan. and Feb. 1923, pp. 1–26 and 95–111, 21 figs. Steel manufacture in open-hearth furnaces; development of regeneration of lost heat; gas producers of various types; furnaces; utilization of heat of flue gases; Hoesch process with oscillating furnace; Talbot process; Duplex process.

OXY-ACETYLENE WELDING

Tanks. Fabricating Storage Tanks by Oxy-Acetylene Welding. Boiler Maker, vol. 23, no. 4, Apr. 1923, pp. 87–90, 8 figs. Methods employed by a producer of gasoline storage tanks to speed up output and increase economy of operation of his plant.

Training Welders. Training Course for Oxy-Acetylene Welders. Am. Welding Soc.—Jl., vol. 2, no. 4, Apr. 1923, pp. 31–57. Report prepared by committee of Am. Bur. of Welding, giving analysis of work of oxy-acetylene or gas welder.

P

PAINTS

Films, Microstructure of. Microstructure of Paint Films. Harold L. Maxwell. Chem. & Met. Eng., vol. 25, no. 19, May 14, 1923, pp. 850–852, 10 figs. Attempt to determine relation between microstructure and protective value of certain paints and pigments.

Fire-Retardant. Report of Fire Retardant Paints for Shingle Roofs. Henry A. Gardner. Paint Mfrs. Assn. of U. S., Scientific Section, Circular No. 175, May 1923, pp. 186–206, 17 figs. Details of tests made and results obtained with a type of paint named Pamak developed by author to prevent fire occurring from flying cinders of passing locomotives or from near-by conflagrations. Note on newer uses for roof paints.

Plasticity. A Study of the Plasticity of Paint. Eugene C. Bingham, Herbert D. Bruce and Martin O. Wolbach. Franklin Inst.—Jl., vol. 195, no. 3, Mar. 1923, pp. 303–317, 2 figs. Materials and method of measurement; densities of mixtures were calculated on assumption that there is neither expansion nor contraction in volume on mixing; conclusions, based on results.

Reflection Factors. The Influence of Paint on Interior Illumination. R. L. Hallett, and Paint Characteristics and Conditions to Be Considered in Effecting Better Illumination. C. H. Bryce. Illuminating Eng. Soc.—Trans., vol. 18, no. 4, Apr. 1923, pp. 338–354 and (discussion) 357–365. First article deals with effect of color and surface finish on reflection of light, and reflection properties of paint made with various materials. Second article discusses use of paint under artificial light and daylight; data on variation of reflection factors of various paints.

PATTERNS

Foundry. Metal Patterns for the Foundry. J. F. Hines. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 695–697, 5 figs. Describes metal patterns developed to produce accurate molds.

PIPE, STEEL

Manufacture. Fabricating Large Steel Pipe. Ellis H. Custer. Am. Mach., vol. 58, no. 19, May 10, 1923, pp. 687–688, 5 figs. Plate edges beveled in rotary shearing machine; rivet holes drilled by jig; press and dies used for curving plate; riveting and calking.

POLISHING MACHINES

Types. Types of Polishing Machines. Bradford H. Divine. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 675–678, 4 figs. Cupola jack polishing machine; advantages of large polishing wheels; drives; motor-driven machines; automatic and semi-automatic machines and attachments.

POWER TRANSMISSION

Radio. Can Power Be Transmitted by Radio? Power Plant Eng., vol. 27, no. 9, May 1, 1923, pp. 482–484, 2 figs. Principles of radio phenomena; possibilities of reflecting or refracting waves; use of standing waves.

PRESSWORK

Blanking Process. How the Blanking Process Is Used To Make a Sheet Metal Sleeve. C. J. Dorer. Am. Mach., vol. 58, no. 17, Apr. 26, 1923, pp. 609–612, 6 figs. Four operations necessary; making die oversize; how blanking die operates; designing piercing die stripper and punch pad; two forming dies used.

Hollow-Ware Manufacture. The Manufacture of Hollow-Ware. Machy. (Lond.), vol. 22, no. 551, Apr. 19, 1923, pp. 73–75, 14 figs. Methods employed by MacFarlane & Robinson, Bushbury Stamping Works, Wolverhampton. Operations and machines.

PULVERIZED COAL

Advantages and Disadvantages. Powdered Coal as Fuel. J. T. Dunn. North East Coast Instn. Engrs. & Shipbldrs., advance paper for meeting Apr. 6, 1923, No. 2733R, 8 pp. Discusses typical installations for burning of pulverized coal; systems of transport of coal from pulverizer to furnace burner, comparing Fuller-Kinyon and Holbeck systems; advantages and disadvantages; costs. See also Chem. Trade Jl., vol. 72, no. 1873, Apr. 13, 1923, pp. 444–446.

Cement Mills. The Use of Pulverized Coal. H. A. Schaffer. Power, vol. 57, no. 19, May 8, 1923, pp. 718–719. Experience gained through use of powdered coal in process of cement manufacture, especially with reference to handling.

Development. The Development of Pulverized Fuel. David Brownlie. Chem. Trade Jl., vol. 72, no. 1873, Apr. 13, 1923, pp. 443–444. Serious rival to mechanical stoking; résumé of rapid development and reasons for it; advantages and disadvantages.

Drying before Pulverization. Why Dry Coal Before Pulverization and Combustion? E. R. Knowles. Combustion, vol. 8, no. 5, May 1923, pp. 311–312. States that "imperative necessity" is too strong a term to be used in considering the dryer question.

Malleable-Iron Foundries. Use Powdered Coal for Malleable. E. E. Griest. Iron Trade Rev., vol. 72, nos. 18 and 19, May 3 and 10, 1923, pp. 1309–1314 and 1387–1392, 7 figs. Application of pulverized fuel to air furnaces for melting points way to further advancement; use for annealing already established; equipment for crushing and handling coal; operating data. Paper presented before Am. Foundrymen's Assn.

Power Plants. Providence Plant Installs Pulverized-Fuel Equipment. Power, vol. 57, no. 18, May 1, 1923, pp. 680–681, 2 figs. Details of boiler plant, driers, pulverizers and separators.

Pulverized Fuel Plant at Providence. Elec. Ry. Jl., vol. 61, no. 17, Apr. 28, 1923, pp. 725–727, 3 figs. United Elec. Rys. is making power-plant improvements to cost upward of million dollars; new boilers equipped to burn pulverized coal are being installed in one-half of boiler house.

Preparation and Combustion. Preparation, Transportation, and Combustion of Powdered Coal. John Blizard. U. S. Bur. of Mines, Bul. 217, 1923, 122 pp., 42 figs. partly on supp. plates. Drying and pulverizing; indirect and direct systems of distribution; bin at furnace system of feeders, mixers and burners; uses of powdered coal; powdered coal for steam raising, and types of boilers to which it is adaptable; costs of preparing and delivering powdered coal to furnace; danger from use of powdered coal; boiler tests with powdered coal.

PUMPS

Rotary. The Stone-Hodgson Rotary Pump. Engineering, vol. 115, no. 2989, Apr. 13, 1923, p. 459, 6 figs. Small and simple pump for service with viscous fluids, also suitable for pumping water for domestic, sanitary and general purposes.

PUMPS, CENTRIFUGAL

Coal Mines. Power in Colliery Working. J. Kirsopp. Power Engr., vol. 18, nos. 204 and 205, Mar. and Apr. 1923, pp. 97–99 and 147–149, 7 figs. Mar.: Modern designs of centrifugal pumps suited to mining requirements. Apr.: Electrically driven sinking pumps.

Diffusers. The Diffuser (Le Diffuseur). Raymond Defeld. France-Belgique, vol. 3, no. 3, Mar. 1923, pp. 106–114, 9 figs. Deals with diffusers of centrifugal pumps. Action of various types of blades.

R

RAILLESS TRACTION

Street Railways vs. Town Transport. H. M. Sayers. Engineer, vol. 135, no. 3514, May 4, 1923, pp. 476–477. Comparison of capital, working and maintenance costs of street railways and trolley buses.

RAILWAY ELECTRIFICATION

Italy. Electrification of the Centrale-Umbra Line of 25-Cycle, 11,000-Volt, Single-Phase Current (La elettrificazione della ferrovia Centrale-Umbria a corrente monofase 11,000 volt periodi). Giuseppe Sona. Rivista Tecnica delle Ferrovie Italiane, vol. 23, no. 3, Mar. 15, 1923, pp. 77–111, 13 figs. partly on supp. plates.—Describes electric equipment, transformers, substations, feed and contact lines, automatic line regulation, locomotives, etc.

RAILWAY MANAGEMENT

Canada. Re-Organization of the Canadian National Railways. Ry. Gaz., vol. 38, no. 15, Apr. 13, 1923, pp. 589–591, 1 fig. System, comprising 22,000 route miles of line, has been divided into three regions for operating purposes, and new organization, termed Strengthened Divisional Scheme, has been introduced.

Purchases and Stores Department. Control of Purchases and Stores on the C. & O. Ry. Ry. Rev., vol. 72, no. 19, May 12, 1923, pp. 795–813, 63 figs. Account of what has been accomplished in past two years; organization, methods and policies responsible for rapid deflation in surplus material stocks and improvement in supply service.

RAILWAY MOTOR CARS

Canada. Rendering a Service That the Modern Public Want. Ry. Rev., vol. 72, no. 17, Apr. 28, 1923, pp. 715–719, 5 figs. Self-propelled car destined to become potent factor in Can. Nat. Ry. service.

Storage-Battery. Storage Battery Cars on the Canadian National. E. B. Walker. Ry. Age, vol. 74, no. 23, May 12, 1923, pp. 1147–1150, 5 figs. Cars maintain schedules which would be difficult for steam trains; operating costs low.

RAILWAY OPERATION

Running-Speed Determination. Determination of Running Speed of Trains by Means of Drawings (Ermittlung der Fahrzeiten durch Zeichnung). W. Müller. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 15, Apr. 14, 1923, pp. 368–371, 6 figs. Describes method for graphical determination of running speed from acceleration forces of locomotives.

Train Control. Automatic Train Control Developments. Ry. Elec. Engr., vol. 14, no. 4, Apr. 1923, pp. 116–120, 4 figs. Describes Richards automatic system, which is of intermittent, non-contact, magneto induction type, affording practically continuous control of train. See also description of Schweyer induction train control, pp. 120–121, 1 fig.

Train Despatching. Telephone Dispatching in Belgium. T. S. Lascelles. Ry. Signal Engr., vol. 16, no. 5, May 1923, pp. 218–220, 1 fig. System introduced by Americans during war is extended on French roads and adopted by Belgium.

Train Dispatching by Radio. J. H. Reed. Railroad Herald, vol. 27, no. 5, Apr. 1923, pp. 28–29. Adaptation of radiophone to train despatching by Frank Wickersham, Signal Engineer of Atanlta & West Point Ry. at College Park, Ga.; promises to replace telegraph; data on stations to be built.

RAILWAY SIGNALING

Block System. Systematic Signal Construction on I. C., John Price. Ry. Signal Engr., vol. 16, no. 5, May 1923, pp. 214–215, 5 figs. Installation of 17 mi. of single-track automatic block signals between Fox Run, Ky., and Graham, comprising 33 automatic signals of 3-position, upper-quadrant, semaphore type; 4 high-voltage, semi-automatic interlocking signals, and 1 semi-automatic dwarf signal.

Elevated Railway. Signaling on the Frankford Elevated (Philadelphia). J. N. Dodd. Elec. Ry. Jl., vol. 61, nos. 17 and 18, Apr. 28 and May 5, 1923, pp. 711–715 and 761–765, 18 figs. Special problems met and how they were solved. Apr. 28: Deals with signals, trips, electric circuits and air lines. May 5: Interlocking features and speed-control signals.

Manufactured by Advertisers CLASSIFIED LIST OF MECHANICAL EQUIPMENT Alphabetical List on page 140

Unions
* Crane Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Unloaders, Car
Link-Belt Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Edward Valve & Mfg. Co.
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
United States Rubber Co.

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Fulton Co.
* Jenkins Bros.
* Simplex Valve & Meter Co.
* Smith, H. B. Co.

Valves, Air, Relief
* Fulton Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Altitude
* Simplex Valve & Meter Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
* Crane Co.
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co.

Valves, Blow-off
* Ashton Valve Co.
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co. Elliott Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Butterfly
* Chapman Valve Mfg. Co.
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Valves, Check
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Electrically Operated
* Chapman Valve Mfg. Co.
* Dean, Payne (Ltd.)
* General Electric Co. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Exhaust Relief
* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.

Valves, Float
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Simplex Valve & Meter Co.

Valves, Foot
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Worthington Pump & Machy. Corp'n

Valves, Gate
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Vogt, Henry Machine Co.

Valves, Hose
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Hydraulic
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Hydraulic Operating
* Chapman Valve Mfg. Co. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Plug
* Chapman Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Nordberg Mfg. Co.
United States Rubber Co.

Valves, Radiator
* American Radiator Co.
* Crane Co.
* Dean Payne (Ltd.)
* Fulton Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Radiator, Packless
* American Radiator Co.
* Fulton Co.

Valves, Reducing
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co. Elliott Co.
* Fulton Co.
* Kieley & Mueller (Inc.)

Valves, Regulating
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Edward Valve & Mfg. Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Simplex Valve & Meter Co.

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Stop & Check
(See Valves, Non-Return)

Valves, Superheated Steam (Steel)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Thermostatically Operated
* Dean, Payne (Ltd.)
* Fulton Co.

Valves, Throttle
* Crane Co.
* Hooven, Owens, Renstchler Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Ventilating Systems
* American Blower Co.
Clarage Fan Co.

Voltmeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Vulcanizers
* Bigelow Co.
New Haven Boiler Works (Inc.)

Wash Bowls
Manufacturing Equipment & Engrg. Co.

Washers, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Washing Machines (Metal Parts)
Crescent Washing Machine Co.

Water Columns
* Ashton Valve Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Water Purifying Plants
* Graver Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.
Wayne Tank & Pump Co.

Water Wheels
(See Turbines, Hydraulic)

Waterbacks, Furnace
Green Engineering Co.

Waterproofing Materials
* Johns-Manville (Inc.)
Texas Co.

Wattmeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Welding and Cutting Work
Linde Air Products Co.

Welding Equipment, Electric
* General Electric Co.

Wheels, Car
* Fuller-Lehigh Co.

Wheels, Polishing Paper
Rockwood Mfg. Co.

Whistles, Steam
* Ashton Valve Co.
Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Winches
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.

Wire, All Metals
Driver-Harris Co.

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Flat
* Roebling's, John A. Sons Co.

Wire, Iron and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* General Electric Co.
* Roebling's, John A. Sons Co.
United States Rubber Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

Worm Gear Drives
* Cleveland Worm & Gear Co.
* Foote Bros. Gear & Mach. Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A., Fdy. & Mach. Co.
Link-Belt Co.

Wrenches
* Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Signaling of the Frankford Elevated. Ry. Signal Engr., vol. 16, no. 5, May 1923, pp. 205–210, 8 figs. Five electropneumatic interlockers and 79 color-light signal is installed in record time.

Interlocking. Interesting Interlockers on the G. N. Ry. Signal Engr., vol. 16, no. 5, May 1923, pp. 211–213, 3 figs. Smashboards and signals controlled, automatically, affording signal protection and eliminating train stops at Gauntlet Bridge.

Route-Lever. Route-Lever Signaling, Winc hester Great Western Railway. Ry. Engr., vol. 44, no. 520, May 1923, pp. 183–187, 7 figs. By Ferreira-Insell system, actuation of one lever simultaneously moves, or holds, all point levers, and then lowers requisite signal for required route.

RAILWAY SWITCHES

Remote Control. Remote Switch Control on New Haven. Ry. Signal Engr., vol. 16, no. 5, May 1923, pp. 216–217, 6 figs. Highly satisfactory results reported after 4 years' experience with 28 low-voltage machines on passing tracks.

RAILWAY TIES

Treated and Untreated. Valuable Data Provided by Twelve Years' Service Record of Treated and Untreated Ties on the Baltimore & Ohio Railroad, Earl Stimson. Wood Preserving News, vol. 1, no. 2, Mar. 1923, pp. 33–37, 4 figs. Test to determine relative values of various kinds of preservatives used in different kinds of wood as compared with untreated white-oak tie.

RAILWAYS

Chile. The Santiago-Valparaiso Railway (Notas acerca del Ferrocarril entre Santiago y Valparaiso por Casablanca), Eduardo Barriga. Instituto de Ingenieros de Chile—Anales, vol. 22, no. 11, Nov. 1922, pp. 654–666. Electric versus steam traction; comparative cost data; details of new route.

Great Britain, 1922. British Railways in 1922. Ry. Gaz., vol. 38, no. 17, Apr. 27, 1923, pp. 651–656. Data on revenue and expenditure; wages; rates and fares, passenger and merchandise traffic; local taxation.

Pan-American Project. Propose Restudy of Pan-American Railway Project, Frank B. Morris. Eng. News-Rec., vol. 90, no. 19, May 10, 1923, pp. 837–839, 1 fig. Proposed route from Columbia to Argentina would tap vast region and enable connection with many existing lines.

REFRACTORIES

Navy Problems. Solving the Refractories Problem of the Navy, Gerald M. Galvin. Am. Soc. Nav. Engrs.—Jl., vol. 35, no. 1, Feb. 1923, pp. 146–162, 10 figs. Specifications for refractories; simulative service test and results; methods now used by Navy in purchasing refractories.

Properties. Properties of Refractory Materials (Sur quelques propriétés intéressantes des matériaux réfractaires), B. Bogitch. Revue Universelle des Mines, vol. 17, no. 2, Apr. 15, 1923, pp. 65–80, 2 figs. Chemical composition; mechanical resistance; expansion; causes of destruction.

REFRIGERANTS

Methyl Chloride. Properties of Methyl Chloride, Charles H. Herter. Refrig. World, vol. 58, no. 4, Apr. 1923, pp. 15–18. Latest available tables; peculiarities to consider in actual operation of machines.

REFRIGERATING MACHINES

Absorption. Proper Steam Pressures for Absorption Refrigerating Machines, A. W. Akins. Power, vol. 57, no. 20, May 15, 1923, pp. 762–763, 1 fig. Presents table giving temperature, pressure and concentration of aqua ammonia and chart showing specific gravity.

REFRIGERATING PLANTS

Temperature and Pressure Readings. Determining Refrigerating Efficiency by Temperature and Pressure Readings, J. H. H. Voss. Refrig. Eng., vol. 9, no. 10, Apr. 1923, pp. 307–312, 9 figs. Points out that simple comparison of practical and ideal cycle should be used by all plants without distinction of size.

REFRIGERATION

Heat Chart, Mollier. Mollier Chart, E. F. Mueller and C. H. Meyers. Refrig. Eng., vol. 9, no. 10, Apr. 1923, pp. 295–296 and 300. Describes new chart issued by Bur. of Standards in which heat content is used as abscissa.

RESEARCH

Industrial. The Need for More Practical Information in Industry, J. S. Unger. Forging & Heat Treating, vol. 9, no. 4, Apr. 1923, pp. 196–199. Lack of dependable information emphasized by relating number of incidents; suggestions for possible researches and investigations.

RIVETED JOINTS

Compression Members. Tests on the Action of Different Kinds of Riveted Joints of Bi-sectional Compression Members (Versuche uber die Wirkung verschiedenartiger Nietverbindungen doppelteiliger Druckstabe), H. Kayser. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 17, Apr. 28, 1923, pp. 408–410, 10 figs. Results of tests carried out to investigate the different arrangements of brace plates of compression member consisting of two crossed angles.

RIVETING

Pneumatic Riveter. Large Portable Riveter. Iron Age, vol. 111, no. 18, May 3, 1923, pp. 1255–1256, 1 fig. Machine for fabricating plates forming volute of casing and penstock for hydraulic turbine.

ROLLING MILLS

Broad-Flanged Girders. Suggestions for Future Design of Special Beam-and-Channel Roll Trains Based on Experiences with Differdinger Broad-Flanged Girders (Anregungen für die Bauart kunftiger Sonderträgerstrassen auf Grund von Erfahrungen an der Differdinger Greystrasse), K. Raabe. Stahl u. Eisen, vol. 43, no. 16, Apr. 19, 1923, pp. 521–527, 7 figs. Notes on development of broad-flanged girders and ideas for new construction; critical analysis of Differdinger rolling-mill installation, consisting of blooming, middle, and finishing mill; author recommends a universal blooming mill; suggestions for calibration.

Rod and Wire. New Wire Mill Has Unusual Features, J. E. McDonald. Iron Age, vol. 111, no. 18, May 3, 1923, pp. 1245–1249, 8 figs. Automatic coiling and conveying system; slow start for motor-driven wire blocks; continuous wire-drawing machines. Rod-rolling and wire-drawing mills of Whitaker-Glessner Co., Portsmouth, O.

Roll Trains. Speed and Work of Roll Trains (La vitesse et le programme des trains de laminoirs), E. Poncelet. Revue de Métallurgie, vol. 20, no. 1, Jan. 1923, pp. 27–31, 1 fig. Progress made in rolling train operation for profile work.

Sheet Mills. Modern Sheet Mill Practice. Blast Furnace & Steel Plant, vol. 11, no. 5, May 1923, pp. 283–284, 1 fig. Describes practical aspect of sheet-mill practice; recent development tending toward combination of one roughing stand between two finishers.

ROLLS

Bending. Power Calculations for Bending Rolls, A. L. Roberts. Machy. (Lond.), vol. 21, no. 547, Mar. 22, 1923, pp. 774–777, 4 figs. Method for calculating strength and deflection of bending rolls and power required to bend flat plates.

S

SAND, MOLDING

Characteristics. On Some Characteristics of Moulding Sands and Their Graphical Representation, J. E. Fletcher. Iron & Steel Inst., advance paper, no. 10, for meeting May 1923, 18 pp., 9 figs. Describes attempt to indicate important characteristics of molding sands by means of simple subsidence method, based on author's earlier experiments.

SCREW MACHINES

High-Speed Spindle for. High-speed Spindle for Screw Machine. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 709–710, 2 figs. Spindle designed for use on bench screw machine for work below ½ in. in diam.; machine has produced small screws at rate of 1600 per hr., including forming, threading and slotting operations.

SCREW THREADS

Comparators. Hartness Modified Screw Thread Comparator. Machy. (Lond.), vol. 22, no. 551, Apr. 19, 1923, p. 81, 2 figs. Describes modified Hartness comparator for inspection of gears and other parts having irregular profiles, in addition to inspection of screw threads.

Costs. Figuring Cost of Threads on a Mileage Basis, C. W. Bettcher. Can. Machy., vol. 29, no. 16, Apr. 19, 1923, pp. 20–21 and 46, 6 figs. Cost of cutting tools; threading tool requirements; selecting right thread; screw-plant layout.

Tools, Position of. Position of Thread-cutting Tool and its Effect on Thread Form, William S. Rowell. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 686–687, 2 figs. Position of tool for external thread cutting; distortion produced in cutting internal threads; distortion of thread grooves having angular sides.

Worm. Normal Thickness of a Worm Thread, E. A. Limming. Machy. (Lond.), vol. 22, no. 552, Apr. 26, 1923, pp. 114–115, 1 fig. Remarks based on articles by author and by A. Fisher in same journal, vol. 21, pp. 360 and 759, respectively.

SEPARATORS

Ash and Coal. Modern Electromagnetic Separation Process to Recover Fuel From Ashes (Die Anwendung des neuen elektromagnetischen Scheideverfahrens zum Rückgewinnen von Brennstoffen aus Feuerungsrückständen im praktischen Betriebe), Wärme, vol. 46, nos. 10 and 11, Mar. 9 and 16, 1923, pp. 103–105 and 113–114, 21 figs. New system of stationary and movable separators of various capacities; magnetic drum separators for large grain; examples of installations at various factories.

SHAFTS

Critical Speeds. Critical Speeds of Shafts, T. E. Dodds. Practical Engr., vol. 67, no. 1887, Apr. 26, 1923, pp. 228–230, 5 figs. Critical speeds due to transverse and torsional vibrations, in machinery.

Whirling of Electrically Loaded. The Whirling of an Overhung Electrically Loaded Shaft, S. Lees. Lond., Edinburgh, & Dublin Philosophical Mag. & Jl. of Sci., vol. 45, no. 268, Apr. 1923, pp. 689–708 and (note by W. McF. Orr), 708–714, 4 figs. Author attempts to indicate kinematics of motion of free end of shaft assuming negligible torsional effects; investigation of elastic yielding at bearing both for symmetrical and unsymmetrical elasticity.

SMOKE ABATEMENT

Problems. Smoke Production and Its Abatement, Chas. F. Wade. Power Engr., vol. 18, no. 205, Apr. 1923, pp. 125–126. Discussion of causes and cures of smoke nuisance.

SOLAR HEAT

Utilization. Using Solar Heat for Automatic Evaporators (L'utilisation de la chaleur solaire par l'emploi d'appareils auto-evaporateurs), P. Caufourier. Génie Civil, vol. 82, no. 14, Apr. 7, 1923, pp. 327–329, 5 figs. Describes Mouchot, Shuman, Berland, and Caufourier evaporators, and their application.

SPRINGS

Locomotive. Modern Locomotive Engine Design and Construction. Ry. Engr., vol. 44, no. 520, May 1923, pp. 188–193, 5 figs. Springs and spring rigging.

STANDARDS

German N. D. I. Report. Report of the German Industrial Standards Committee (Normenausschuss der Deutschen Industrie). Maschinenbau, vol. 2, no. 13, Mar. 24, 1923, pp. N85–N95, 15 figs. Tentative proposals for cylindrical and conical drill bushings, and castellated nuts. Proposed standards for paper sizes, pressure and suction hose and couplings.

STEAM

Driers for. A Centrifugal Anti-Priming Steam Dryer, Power Engr., vol. 18, no. 206, May 1923, pp. 188–189, 5 figs. Principle and application of Tompkins' steam drier which, acting as centrifugal separator, insures dry steam without superheating.

High-Pressure. Using Steam at Very High Pressure (L'Emploi de la vapeur à très haute pression), Ouvrier Moderne, vol. 6, no. 1, Apr. 1923, pp. 9–11, 3 figs. Theoretical advantages of using high-pressure steam; advantages for steam engines; notes on Schmidt 60-atmos. boiler.

STEAM ACCUMULATORS

Types. Steam Accumulators (Les accumulateurs de vapeur), M. Emanaud. Technique Moderne, vol. 15, nos. 7 and 8, Apr. 1 and 15, 1923, pp. 193–197 and 237–241, 13 figs. Principles; operation; describes various types, especially hot-water accumulators; applications.

STEAM-ELECTRIC PLANTS

California. The Midway Plant of the San Joaquin Light & Power Corporation, E. A. Quinn. Jl. Elec. & Western Industry, vol. 50, no. 8, Apr. 15, 1923, pp. 288–291, 5 figs. Situated at Buttonwillow, Cal.; details of design and equipment; each unit has capacity of 12,500 kva., generating at 11,500 volts.

Milwaukee. The Lakeside Electric Power Station at Milwaukee. Engineer, vol. 135, nos. 3511, 3512, 3513 and 3514, Apr. 13, 20, 27 and May 4, 1923, pp. 383–386, 409–411, 437 and 418, and 480–481, 18 figs. partly on p. 422. New station is intended for ultimate capacity of 200,000 kw. and is specially designed for use of pulverized coal as fuel; details of coal crushing and pulverizing; main power equipment; boiler and economizers.

Records. Accurate Records Required for Plant Progress, John M. Drabelle. Power Plant Eng., vol. 27, no. 9, May 1, 1923, pp. 470–472, 2 figs. Deals with records and statistics of operation, quantities, and financial expenses.

STEAM ENGINES

Reciprocating. Erection and Operation of Reciprocating Steam Engines (Aufstellung und Betrieb der Kolbendampfmaschinen), Wärme- u. Kälte-Technik, vol. 25, nos. 6 and 7, Mar. 15, Apr. 1, 1923, pp. 45–47 and 53–54. Steam consumption; insulation of steam piping, cylinders, etc.; superheated steam; bearings; lubricants; smooth running.

Uniflow. Driving a Textile Mill by a Uniflow Engine. Power Engr., vol. 18, no. 206, May 1923, pp. 185–188, 5 figs. Describes Sulzer 1100-i.hp. engine for driving textile mill.

STEAM POWER PLANTS

Accessories. Steam Plant Accessories. Beama, vol. 12, no. 61, May 1923, pp. 315–317, 5 figs. Describes water heaters, oil separators and steam traps made by firm of Holden & Brooke, Manchester, England.

Benson Super-Pressure. The Benson Super-Pressure Plant, P. W. Swain. Power, vol. 57, no. 21, May 22, 1923, pp. 796–801, 5 figs. Details of plant at Rugby, England, designed for minimum boiler pressure of 3200 lb.; steam is generated without ebullition, by operating steam generator in "super-pressure" region, that is, region above critical point; claims made for plant are large saving in fuel cost, reduction in initial cost, substantial saving in floor space and in weight.

Records. Power Plant Records, Fred S. Rutledge. Nat. Engr., vol. 27, no. 5, May 1923, pp. 218–221, 5 figs. Systematic method of tabulating important data is essential to efficient operation of a power plant; examples of what this means.

Steam Extraction. Possibilities in Stage Heating and Steam Extraction in Steel Mill Power Plants, H. T. Watts. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 4, Apr. 1923, pp. 105–116, 3 figs. Relates to principles involved, and possible applications to steam plants within steel works.

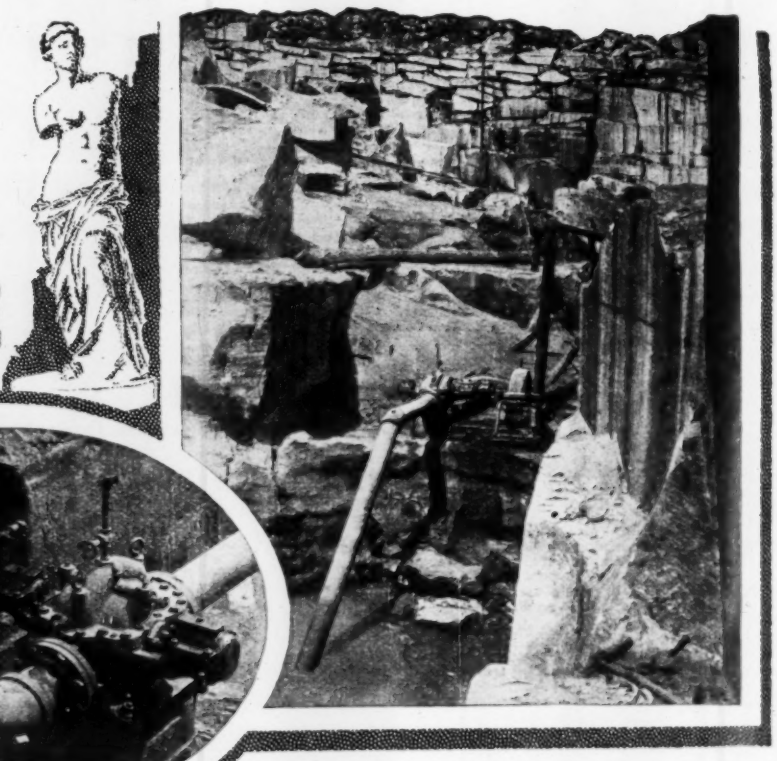
STEAM TURBINES

Failures. Details of Indianapolis Turbine Wreck. Power, vol. 57, no. 20, May 15, 1923, pp. 760–761, 3 figs. Details of failure of 10,000-kw. turbine of Indianapolis Light & Heat Co.

Geared. The Design of Pinions for Geared Turbines, Richard Gardner. Engineering, vol. 115, no. 2291, Apr. 27, 1923, pp. 512–513, 4 figs. Calculation of greatest deflection of pinion with and without center bearing.

Inspection. Pointers on the Inspection of Steam Turbines, John T. Willison. Power Plant Eng., vol. 27, nos. 5 and 6, Mar. 1 and 15, 1923, pp. 271–274 and 309–311, 6 figs. Mar. 1: Oiling system, bear-

PERMANENCE



HERE is a Terry performing under difficulties. Installed in a marble quarry, exposed to the elements, clamped to irregular rocky surface without grouting, strained by unsupported pipes —but still it functions and drains the water from the quarry so that beautiful building material can be removed. It may be a long way from the statue of Venus to a Terry turbine, but though it was once stormed by the elements and buried in volcanic dust, Venus has been restored to us and still functions as a work of art. We can only surmise what beauty this statue might now possess had it received the protection such creations should have. But, we know what Terry turbines will do under the care and protection of the modern power plant, for ninety-six of the first hundred Terrys which were made some twenty years ago are still in operation. Inbuilt permanence is a Terry feature which you should consider.

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Offices in Principal Cities in U.S.A. also in Important Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.

ings, packing, and alignment. Mar. 15: Inspection of piping and associated equipment.

Ljungström. 5,000-Kilowatt Brush-Ljungström Steam Turbine. Engineering, vol. 115, nos. 2992 and 2993, May 4 and 11, 1923, pp. 542–545 and 577–578, 61 figs. partly on supp. plates and p. 588. Details of turbine constructed by Brush Elec. Eng. Co., Loughborough, England.

Operation and Maintenance. Steam Turbine Operation and Maintenance. Terrell Croft. Nat. Engr., vol. 27, no. 5, May 1923, pp. 206–211, 4 figs. General precautions that should be observed; starting newly installed turbine; care of turbine while in operation; inspections and adjustments.

Single-Flow Reaction. Largest Single-Cylinder, Single-Flow Reaction Turbine Yet Built. Power, vol. 57, no. 20, May 15, 1923, pp. 746–752, 14 figs. First of new type turbines undertaken by Westinghouse Co.; large capacity at moderate peripheral speeds and conservative stresses made possible by use of Baumann system of blading; symmetrically expanding steam path eliminates eddies; provision is made for bleeding at four points.

Speed Regulation. Steam-Turbine Governors and Valve Gears Adjusting Speed and Speed Regulation. Eustis H. Thompson. Power, vol. 57, no. 21, May 22, 1923, pp. 790–795, 5 figs. Points out that no-load speed of turbine depends primarily on tension or compression of main governor spring; increasing spring resistance to centrifugal pull of moving weights or flyballs will ordinarily raise no-load operating speed; governor-speed regulation can be adjusted by one or more of three general methods which are explained.

Valve Gears. Schenectady Type General Electric Valve Gear. Eustis H. Thompson. Power, vol. 57, no. 19, May 8, 1923, pp. 710–715, 10 figs. Design and advantages of Gen. Elec. Schenectady type of valve gear for steam turbines.

Steam Turbine Governors and Valve Gears—Adjusting the Valve Travel. Eustis H. Thompson. Power, vol. 57, no. 18, May 1, 1923, pp. 675–678, 3 figs. Principles of adjustments.

STEEL

Alloy. See ALLOY STEELS

Chrome. See CHROME STEEL.

Cold Working. The Cold-Working of Steel with Reference to the Tensile Test. John Stead. Iron & Steel Inst., advance paper, no. 21, for meeting May 1923, 39 pp., 13 figs. Results of experiments to obtain true stress-strain diagram from yield point to fracture of steel undergoing ordinary tensile test, and from it to derive equation connecting stress and strain.

Globular Cementite. Some Properties of Steels Containing Globular Cementite. Cecil H. Desch and Aubrey T. Roberts. Iron & Steel Inst., advance paper, no. 8, for meeting May 1923, 11 pp., 4 figs. First section deals with effect of heat treatment on 1.28-per cent carbon steel slowly cooled from molten state, and heated under such conditions as to produce globular cementite; second section describes experiments on steels used in manufacture of safety-razor blades, with account of factors which determine their efficiency.

Impact Tests. An Investigation of the Behavior of Certain Steels under Impact at Different Temperatures. F. C. Langenberg. Iron & Steel Inst., advance paper, no. 16, for meeting May 1923, 34 pp., 19 figs. Results of experiments made with Charpy impact-testing machine of 2170 ft-lb. capacity.

Stainless. Considering the Properties of Stainless Steel. R. N. Richardson. Can. Machy., vol. 29, no. 17, Apr. 26, 1923, pp. 27 and 42. General composition; heat treatment; high tensile strength; degree of hardness; etc.

Tin in, Effect of. Some Observations on the Effect of Small Quantities of Tin in Steel. J. H. Whiteley and A. Braithwaite. Iron & Steel Inst., advance paper, no. 24, for meeting May 1923, 9 pp., 8 figs. Experimental evidence showing that presence of small percentages of tin in medium carbon steel is liable seriously to impair its ductility, so that in rails even 0.06 per cent may be unsafe. Appendix on estimation of small quantities of tin in steel. J. H. Whiteley.

Vanadium in, Action of. Vanadium in the Steel Foundry. J. Kent Smith. Foundry Trade Jl., vol. 27, no. 347, Apr. 12, 1923, pp. 302–303. How vanadium acts on steel; detailed action; steel castings and forgings; typical results.

Zirconium in, Effect of. Some Effects of Zirconium in Steel. F. M. Becket. Iron Age, vol. 111, no. 19, May 10, 1923, pp. 1321–1323. Remarkable effect on rolling properties in presence of high sulphur; deoxidizer and scavenger; role in heat-treated steel.

STEEL CASTINGS

Naval Ship. Notes on Inspection and Manufacture of Steel Castings for Naval Ships. Carlos Bean. Am. Soc. Nav. Engrs.—Jl., vol. 35, no. 1, Feb. 1923, pp. 137–145, 4 figs. Discusses two defects which cause rejection of castings, namely, porosity and cracks; methods used by Roxbury Steel Castings Co. in casting steel valve body for U. S. scout cruisers nos. 7 and 8.

STEEL, HEAT TREATMENT OF

Basic Facts. Heat-treatment of Steel with Special Reference to Production. J. W. Urquhart. Machy. (Lond.), vol. 22, no. 552 and 553, Apr. 26 and May 3, 1923, pp. 110–111 and 139–141, 2 figs. Outline of basic facts, modified by present-day experience, with special reference to tests undertaken by English authority.

Quenching. Some Investigations on the Quenching of Carbon Steels. Tokujiro Matsushita. Iron & Steel Inst., advance paper, no. 18, for meeting May 1923, 18 pp., 10 figs. Results of experimental investigations made with special quenching apparatus; results obtained.

STEEL WORKS

Electric Power in. Economic Principles Governing the Use of Electrical Power in Iron and Steel Works. C. A. Ablett. Iron & Steel Inst., advance paper, no. 1, for meeting May 1923, 16 pp., 1 fig. Discusses power produced by works themselves from natural resources available within works, from exhaust steam and from fuel used for that purpose, and power purchased from outside source.

STOKERS

Chain-Grate. A Chain Grate Stoker Installation Fifty Years Old. David Brownlie. Combustion, vol. 8, no. 5, May 1923, pp. 294–303; 9 figs. History of mechanical stoking, particularly chain-grate stoker; details of working of chain-grate stokers of Whitworth-Wrigley modification of original John Juckes stoker installed about 1870–1875 in Ordsall Dye Works, Manchester, England, and still running.

SYMBOLS

Standardization. Standard Terminology for Calculation of Strength of Engineering Works, and for Testing of Iron and Steel (Einheitliche Bezeichnungen für die Festigkeitsberechnungen von Ingenieurbauwerken, sowie für das Prüfungsverfahren von Eisen und Stahl). H. Kommerell. Bauingenieur, vol. 4, no. 5, Mar. 15, 1923, pp. 150–153, 1 fig. Mathematical symbols; abbreviations for time, weight and measure units; symbols for terms of mechanics and statics, for molding and bar iron, etc.

T

TAPS

Collapsible. Collapsible Taps. Roy G. Mumma. Machy. (N. Y.), vol. 29, no. 9, May 1923, pp. 706–708. Advantages; limitations in regard to pitch of thread; general classes of work for which collapsible taps are adapted; different styles and their application; chasers.

TERMINALS, RAILWAY

Freight. New Claremont Freight Terminal. L. V. R. R. Ry. Rev., vol. 72, no. 17, Apr. 28, 1923, pp. 726–731, 11 figs. Describes new freight pier on New York harbor at Jersey City, two-thirds of mile long and 400 ft. wide; first of three piers to be built; whole will comprise one of largest and best equipped freight terminals of metropolitan district.

Passenger. The Proposed Cleveland Union Passenger Station. Ry. Rev., vol. 72, no. 17, Apr. 28, 1923, pp. 731–732. Important terminal development for steam and electric railways promoted by Van Sweringen interests.

Slips and Crossings. Turnout Slips and Crossings, Chicago Union Station. Ry. Rev., vol. 72, no. 18, May 5, 1923, pp. 765–767, 2 figs. Account of manner in which certain difficult problems were met, including that of insulation; cost figures.

TEXTILE MILLS. See COTTON MILLS.

THERMOMETERS

Electric. Electric Thermometers (Les thermomètres électriques). Industrie Electrique, vol. 32, no. 739, Apr. 10, 1923, pp. 125–128, 5 figs. Temperature measurement in electric central stations; use of pyrometers, thermocouples, and resistance thermometers, their advantages and drawbacks.

TIME STUDY

Development. Time Study. Dwight V. Merrick. Taylor Soc.—Bul., vol. 8, no. 2, Apr. 1923, pp. 66–68. Review of development since introduction by Taylor; suggestions in taking time studies.

TOLERANCES

Unilateral. The Advantages of Unilateral Tolerances. E. C. Peck. Am. Mach., vol. 58, no. 19, May 10, 1923, pp. 703–705, 1 fig. Economy of being able to use standard gages; necessity of unvarying zero point; comparison with bilateral system.

TRACTORS

Tracklayer Type. Full Tracklayer Type Tractor Added to Bates Line. Automotive Industries, vol. 48, no. 12, Mar. 22, 1923, pp. 670–671, 2 figs. Details of tractor developed by Bates Machine & Tractor Co., known as Model 40; Midwest engine with 4.75 in. bore and 6 in. stroke, developing 55 hp.; weighs 8500 lb.; drawbar pull 6500 lb.

TRANSPORTATION

Automotive Intra-City. Successful Tractor and Semi-Trailer Railroad-Terminal Haulage. J. F. Murphy. Soc. Automotive Engrs.—Jl., vol. 12, no. 5, May 1923, pp. 467–472, 5 figs. Describes system of automotive transportation for intra-city hauling and movement of merchandise between railway terminals; points out principal advantages gained through use of automotive equipment of type described.

Costs. Reducing the Exporter's Transport Costs. J. A. Dunnage. Indus. Management (Lond.), vol. 9, no. 8, Apr. 19, 1923, pp. 231–232. Information showing how economies may be effected.

Highway. Military and Commercial Highway-Transport. Brainerd Taylor. Soc. Automotive Engrs.—Jl., vol. 12, no. 5, May 1923, pp. 413–432, 7 figs. Presentation of practical solution for coordination of military and commercial transport with rail and water transport. The Army plan of highway transport, its development, commercial organization, location of traffic centers, formation of highway-transport centers; etc.; maintenance activities in army plan.

Motor-Bus and Railway Coördination. The Coördination of the Motorbus and the Street Railway. C. D. Emmons. Soc. Automotive Engrs.—Jl., vol. 12, no. 5, May 1923, pp. 433–436 and 464. Author reviews attempts made to displace railways and substitute motor-vehicle service, discusses limitations of motor-bus service and factors of expense that apply to motor vehicle when it becomes common carrier.

Status and Needs, U. S. Our National Transportation System. J. Rowland Bibbins. New York R. R. Club—Official Proc., vol. 33, no. 5, Mar. 16, 1923, pp. 6982–7018 and (discussion) 7019–7036, 27 figs. Perspective of status and needs of industry in United States, and possibilities of more complete operating unification; real meaning of coördination.

TUBES

Seamless-Steel. Plant Making Small Weldless Tubes. Iron Age, vol. 111, no. 20, May 17, 1923, pp. 1399–1402, 6 figs. Specially designed mill with rapidly adjustable piercer for product 1½ to 3½-in. outside diam.; 12-roll straightener a feature.

V

VAPORS

Specific Heat. New Equations for the Determination of the Specific Heat of Dry Saturated Vapors and Boiling Liquids (Neue Gleichungen zur Bestimmung der spezifischen Wärme trocken gesättigter Dämpfe und siedender Flüssigkeiten, etc.). Victor Fischer. Zeit. fur technische Physik, vol. 4, no. 1, 1923, pp. 29–36, 5 figs. Applications of equations to carbonic acid and air. See also article by same author in same journal, vol. 4, no. 2, pp. 72–76.

VARNISHES

Viscosity and Color Standards. Reprint of Circulars on Viscosity and Color Standards for Varnishes. H. A. Gardiner and P. C. Holdt. Paint Mfrs. Assn. of U. S., Scientific Section, Circular No. 178, Apr. 1923, pp. 227–236, 2 figs. Reprint of circulars entitled "A Standardized Apparatus for Air Bubble Consistency Test on Varnish," and "Suggestions for Color Standards for Varnish," bringing out changes that have been made in methods of preparing standards.

VISCOSIMETERS

Göckel. Viscosimeters (Viscosimeter). E. Stern. Chemiker-Zeitung, vol. 47, no. 41, Apr. 5, 1923, pp. 291–292, 1 fig. Describes new apparatus by H. Göckel, Berlin, and its application.

W

WATER POWER

Pacific Coast. Water Power Potentialities of the Pacific Coast. Frederick H. Fowler. Am. Soc. Civ. Engrs.—Proc., vol. 49, no. 5, May 1923, pp. 917–941, 1 fig. Study of problem from standpoint of market demand for future development.

WELDING. See ELECTRIC WELDING, ARC; OXY-ACETYLENE WELDING.

WELFARE WORK

Permanent Exhibition, Germany. Permanent Welfare Exhibition. H. Bertheau. Eng. Progress, vol. 4, no. 3, Mar. 1923, pp. 61–63, 6 figs. Establishment of German exhibition; department for prevention of accidents; department for industrial hygiene.

System at Steel Works. Practical and Commercial Welfare at Stanton. Iron & Coal Trades Rev., vol. 106, no. 2874, Mar. 30, 1923 pp. 451–452, 6 figs System employed by Stanton Ironworks Co., Nottingham, England.

WIRE DRAWING

Continuous Machine. Morgan-Connor Continuous Wire Machine. Kenneth B. Lewis. Iron Age, vol. 111, no. 20, May 17, 1923, pp. 1409–1412, 3 figs. Operates on flexible principle of looping mill; maintains tension without slip; survey of development of continuous wire drawing.

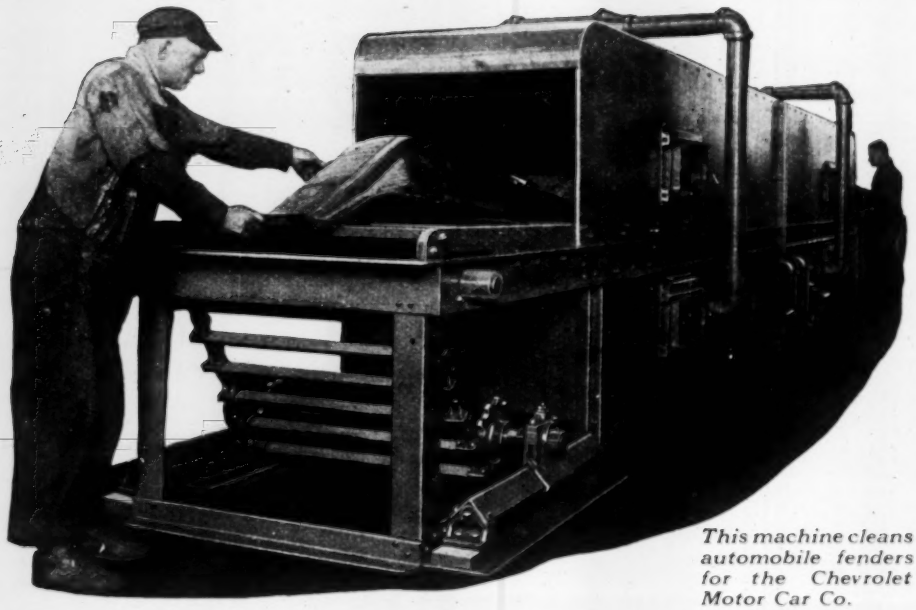
WIRE ROPE

Tests. Some Tests of Steel-Wire Rope on Sheaves. Edward Skillman. U. S. Bur. of Standards—Technologic Papers, vol. 17, no. 229, Mar. 2, 1923, pp. 227–243, 14 figs. Tests of wire rope of 6-strand, 19-wire construction were made on sheaves of 10-, 14- and 18-in. diam. to determine their strength under static load; it was found that strength on sheaves was less than that of straight ropes.

WORKMEN'S COMPENSATION

Social Insurance and. Workmen's Compensation and Social Insurance. Monthly Labor Rev., vol. 16, no. 1, Jan. 1923, pp. 158–179. Comparison of compensation laws in United States. Recent compensation reports. Old-age pensions in Denmark. British labor and unemployment insurance. 20 years' operations of State Insurance Inst. of Sweden.

ANNOU

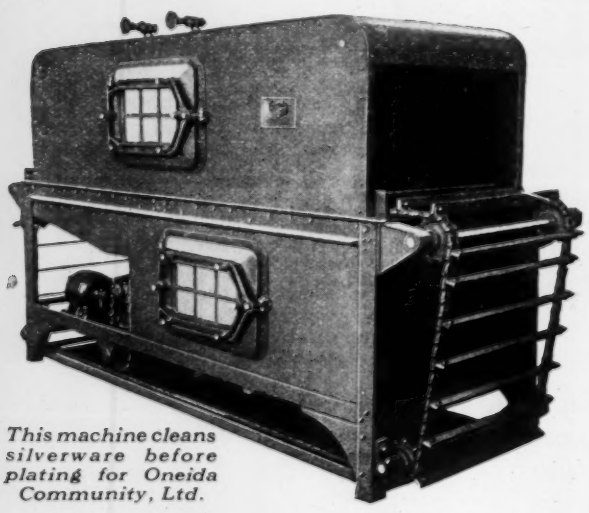


This machine cleans automobile fenders for the Chevrolet Motor Car Co.

Standard and specially designed machines for every metal cleaning purpose

The Crescent Washing Machine, shown above, was especially designed for the Chevrolet Motor Car plant at Cincinnati, for washing and rinsing the entire output of automobile fenders before enameling.

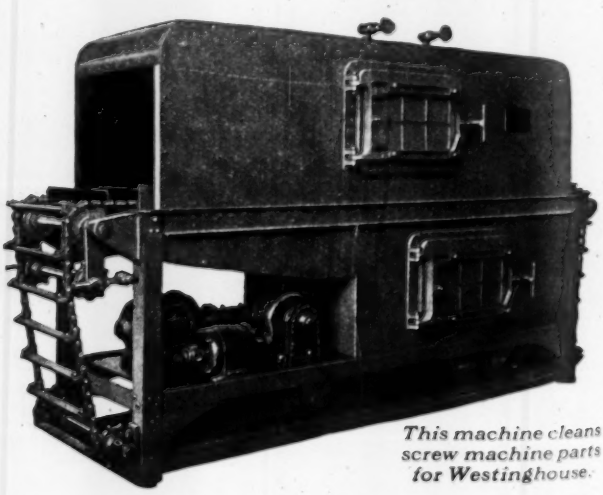
In addition to our standard hand power and automatic conveyor type machines we design and construct special composite type machines *of any size*—engineered to the special requirements of your plant.



This machine cleans silverware before plating for Oneida Community, Ltd.

CRESCENT MODEL 2A

Standard automatic conveyor type machine suitable for use in the average metal cleaning department. Cleans metal parts of every shape and size up to 26" wide.



This machine cleans screw machine parts for Westinghouse.

CRESCENT MODEL 1A

The smallest automatic, conveyor type, metal-cleaning machine on the market. It will clean metal parts of every description not exceeding 18" in width.

THE ENGINEERING INDEX

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THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

Photoprint copies (white printing on a black background) of any of the articles listed in the Index may be obtained at a price of 25 cents a page. When ordering photoprints identify the article by quoting from the Index item; (1) Title of article; (2) Name of periodical in which it appeared; (3) Volume, number, and date of publication of periodical; (4) Page numbers. A remittance of 25 cents a page should accompany the order. Orders should be sent to the Engineering Societies Library, 29 West 39th Street, New York.

(See also page 512 of this issue for supplementary items.)

AERONAUTICAL INSTRUMENTS

Multimanograph. The Costanzi Multimanograph Aerial Age, vol. 16 no. 6, June 1923, pp. 275–276, 2 figs. Describes instruments developed by Italian army officer for registering variation and magnitude of forces acting on various points of airplane in flight under any flying conditions; consists of battery of 21 very sensitive manometric capsuls.

AIR COMPRESSORS

Electrically Driven. Electrically-driven Air Compressors. Engineer, vol. 135, no. 3515, May 11, 1923, p. 508, 1 fig. on p. 500. Compressed-air plant, consisting of four compressors, having capacity of 2500 cu. ft. per min., at pressure of 75 lb. per sq. in.; installed at a Durham coal mine, constructed by Ingersoll-Rand Co.

Explosions. Explosions in Air Compressors, J. A. Vaughan. S. African Instn. Engrs.—Jl., vol. 21, no. 9, Apr. 1923, pp. 171–196, 7 figs. Review of 16 official inquiries by Dept. of Mines & Industries into circumstances attending explosion or firing in compressed air systems of mines in Transvaal.

Losses. Lost Work in Air-Compressing Plant, A. E. Simmonds. S. African Instn. Engrs.—Jl., vol. 21, no. 9, Apr. 1923, pp. 197–209, 12 figs. Information concerning installation and operation of reciprocating air compressors; deals with external and internal losses.

Multi-Stage Calculation. The Calculation of Multi-Stage Compressors (Berechnung mehrstufiger Kompressoren), M. Seiliger. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 19, May 12, 1923, pp. 460–463, 2 figs. Graphic method for precalculation without use of entropy chart; introduction of logarithmic coördinates makes it possible to plot variation of state with straight lines.

AIR CONDITIONING

Bibliography. Public Health Engineering Abstracts, U. S. Pub. Health Service, no. K-301, Mar. 24, 1923, 7 pp. Abstracts on air conditioning.

Silk Mills. Humidity in Silk Mills, A. W. Thompson Textile World, vol. 63, nos. 14 and 19, Apr. 7 and May 12, 1923, pp. 115 and 117, and 55 and 57. Describes processes that are necessary as a background for proper consideration of atmospheric conditions, and part they play in the industry. Silk responds quickly to changes in humidity; importance of regain factor in commercial transactions; importance of using sling psychrometer.

AIRCRAFT

French Industry. Glimpses of the French Aircraft Industry. Aviation, vol. 14, no. 25, June 18, 1923, pp. 664–665, 1 fig. Report issued by Aeronautical Chamber of Commerce of America. Notes on capital invested, government aid; some wasteful methods; principal engines used.

Stabilizers. On the Application of the Gyroscope to the Solution of the "Vertical" Problem of Aircraft, James C. Gray. Roy. Soc. Edinburgh—Proc., vol. 42, part 3, session 1921–22, pp. 257–317, 38 figs. Describes inventions relating to apparatus for finding, maintaining, and thus defining, true vertical and horizontal on airplanes and airships; principle of Gray stabilizers; Gray vertical indicator; adjustment of stabilizers; sensitiveness of ball erectors; desirability of using powerful gyroscopes.

AIRPLANE ENGINES

Air-Cooled. The 220 Hp. Lawrence J1 Air-Cooled Aero Engine. Flight, vol. 15, no. 14, Apr. 5, 1923, pp. 183–184, 4 figs. Particulars of Lawrence 9-cylinder radial air-cooled engine, which was fitted to Curtiss TR1 seaplane.

High-Altitude. Adaptation of Aeronautical Engines to High Altitude Flying, K. Kutsbach. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 142, May 1923, 30 pp., 43 figs. on supp. plates. Limits of engine output; high-altitude engines; influence of air density on proportions of mixture; methods of varying proportions of mixture; automatic prevention of fuel waste; design and application of air-pressure regulators to high-altitude flying. Translated from Technische Berichte, vol. 3, no. 4.

Radiators. Experiments with a Built-In or Fuselage Radiator, C. Wieselsberger. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 141, May 1923, 12 pp., 4 figs. Experiments carried out to determine whether radiators having similar cooling properties offer less resistance when incorporated in fuselage, than when hitherto customary arrangment is employed, with radiator in free air current more or less independent of fuselage. Translated from Technische Berichte, vol. 3, part 4.

AIRPLANE PROPELLERS

Efficiency Curve. The General Efficiency Curve for Air Propellers, Walter S. Diehl. Nat. Advisory Committee for Aeronautics—Report no. 168, 1923, 11 pp., 4 figs. Study of propeller efficiency based on given formula which, it is shown, may be used to obtain general efficiency curve in addition to well-known maximum efficiency curve.

AIRPLANES

Ailerons. Notes on the Design of Ailerons, W. S. Diehl. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 144, June 1923, 10 pp., 3 figs. Notes compiled from various sources in order to supply data and instructions for obtaining satisfactory results based on given requirements.

Battleships vs. The Question of Battleships versus Airplane. Aviation, vol. 14, no. 24, June 11, 1923, pp. 634–638. How it is viewed by General Board of Navy and by Admirals Fullam and Moffett.

Commercial. Low Operating Cost Is Essential to Commercial Planes, Archibald Black. Automotive Industries, vol. 48, no. 23, June 7, 1923, pp. 1232–1234, 4 figs. Design should give aerodynamic balance over entire range of flying speeds; single-engined type preferable; interchangeable parts facilitate service.

Damping, Measurement in Flight. The Measurement of the Damping in Roll on a JN4h in Flight, F. H. Norton. Nat. Advisory Committee for Aeronautics—Report, no. 167, 1923, 6 pp., 6 figs. Investigation carried out for measuring value of $L\phi$ in flight; results show that damping found in wind tunnel by method of small oscillations is in general 40 per cent higher than damping in flight; also that at 50 m. p. h. lateral maneuverability is low.

Dietrich. The Dietrich Onè-Passenger Biplane DPI (Der Dietrich-Passagier-Doppeldecker DPI), C. Kreuter. Motorwagen, vol. 26, no. 11, Apr. 20, 1923, pp. 170–171, 2 figs. Machine is said to be smallest passenger biplane in Germany. Characteristics: Surface area, 14 sq. m.; weight empty, 350 kg.; load capacity, 200 kg.; power plant, 85-hp. 7-cylinder Siemens-Halske or 90-hp. 6-cylinder Haacke-Stern engine; speed, 140 km. per hr.

Gliders. "Flight" Glider Designing Competition. Flight, vol. 15, nos. 16, 17, 18 and 19, Apr. 19, 26, May 3 and 10, 1923, pp. 211–214, 229–231, 242–244 and 253, 20 figs. Apr. 19: Performance calculation, weight estimate and constructional details of Turkey Buzzard. Apr. 26: Wing construction. May 3: Wing fittings. May 10: Undercarriage.

Longitudinal Control. Notes on the Determination of Longitudinal Control Forces of Airplanes During Horizontal Flight. Aerial Age, vol. 16, no. 6, June 1923, pp. 267–268. Principal factors governing longitudinal control are (1) location of center of gravity, (2) hinge moment due to weight of elevators, and (3) slipstream effect on tailplane.

Low-Powered. Low Powered Airplanes and Gliding Experiments, Ladislas d'Orcy. Aviation, vol. 14, no. 24, June 11, 1923, pp. 640–642, 2 figs. Symposium of conflicting opinions regarding their value as voiced by French press.

The Gnosspelius Light Aeroplane. Aeroplane, vol. 24, no. 19, May 9, 1923, pp. 344, 346 and 348, 2 figs. Low-powered machine, with motorcycle engine, is cantilever monoplane of 36 ft. span, with boat-built body of circular section; total weight loaded, 450 to 500 lb.; built for test purposes.

Monoplane, Variable-Camber. A Variable Camber Monoplane. Flight, vol. 15, no. 11, Mar. 15, 1923, pp. 143–145, 7 figs. Describes airplane which is an experiment of Aircraft Disposal Co.

Parnall Possum Triplane. The Parnall "Possum" Triplane. Flight, vol. 15, no. 19, May 10, 1923, p. 249, 1 fig. Machine, which is fitted with Napier "Lion" engine, has central engine housing and propellers placed on wings; length, 39 ft.; span, 46 ft.; wing area, 777 sq. ft.; weight loaded, 6300 lb.; built for Air Ministry.

Passenger. Safety and Comfort Chief Essentials in Passenger Airplane Design, Archibald Black. Automotive Industries, vol. 48, no. 24, June 14, 1923, pp. 1284–1287, 5 figs. Space usually provided for 8 or 10 seats; sleeping berths will be required in future; doors should be large enough to accommodate persons of average size; proper ventilation needed.

Seaplanes. See SEAPLANES.

Sport. The Swanson Model 3 Sport 'Plane. Flight, vol. 15, no. 20, May 17, 1923, p. 261, 2 figs. Describes airplane designed and constructed by S. Swanson of Vermilion, S. D., and results of its test flight.

Wibault Fighter. The Wibault Monoplane Fighter. Aeroplane, vol. 24, no. 22, May 30, 1923, p. 399, 2 figs. Details of supercharged high-altitude fighter developed by French Air Service; thick-winged parasol monoplane with rigid struts bracing wings at about half their span.

Wings. Calculations for a Single-Strut Biplane with Reference to the Tensions in the Wing Bracing, O. Blumenthal. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 143, June 1923, 28 pp., 6 figs. Example is worked out for heavily staggered biplane with single rigid outer strut; it is shown that moderate initial tension of cable up to about 15 per cent of total weight, exerts no harmful influence on strength of SSW airplane and is even advantageous for lower rear spar. Translated from Technische Berichte, vol. 3, no. 5.

Determination of the Static Test Index of Transport Planes Deducted From the Dynamic Action of an Aerial Shape (Note sur la détermination de l'indice d'essai statique des avions de transport déduit de l'action dynamique d'une houle aérienne), Louis

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Mtls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 128

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Machy. Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Elec & Mfg. Co.
Weston Electrical Instrument Co.

Anchorages, Overhead Transmission
Midwest Steel & Supply Co.

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Babbit Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdy. & Mach. Co.
* Timken Roller Bearing Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Leatner
American Sole & Belting Leather Tanners (Inc.)

Belting, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Machy. Co.

Blocks, Tackle
Clyde Iron Works Sales Co
* Roebling's, J. A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Baffles
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Boiler Compounds
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Connelly, D. Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.
Link-Belt Co.

Bridgewalls (Furnace)
McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg Co.
* Jones, W. A. Fdry. & Mach. Co
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Cars, Charging
Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Breguet and René Devillers. Aérophile, vol. 31, no. 7-8, Apr. 1-15, 1923, pp. 102-106. Determination of ratio to be adopted between rupture charge of airplane wings and that to which they are usually subjected in flight; formulas and calculations.

AIRSHIPS

Hull Stresses, Balancing. Aircraft as an Engineering Problem, Ralph H. Upson. Mich. Technic, vol. 36, no. 3, Mar. 1923, pp. 5-7, 3 figs. Discusses balance of all forces acting on hull.

Inertia. The Inertia Coefficients of an Airship in a Frictionless Fluid, H. Bateman. Nat. Advisory Committee for Aeronautics—Report, no. 164, 1923, 16 pp., 3 figs. Investigation of apparent inertia of airship hull, and case of rotation of airship hull.

ALLOY STEELS

Developments. The Large Place Taken by Alloy Steels, J. Kent Smith. Iron Age, vol. 111, no. 23, June 7, 1923, pp. 1621-1623. Recent developments in connection with vanadium, chrome, tungsten and molybdenum; iron foundry progress with alloys.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Bronze. See BRONZE.

Extra-Light. Magnesium and Extra-Light Alloys (Le magnésium et les alliages ultra-légers), A. Portevin. Société des Ingenieurs Civils de France—Procès Verbal, no. 8-9, Apr. 20, 1923, pp. 319-323. Properties of extra-light alloys, including magnesium; advantages, and utilization.

Liquation in. Liquation Phenomena in Metal Alloys, O. Bauer and H. Arndt. Brass World, vol. 19, nos. 4 and 5, Apr. and May 1923, pp. 103-107 and 160-162, 17 figs. Influence of velocity of cooling upon liquation of metals that form mixed crystals during cooling; explains "reversible" block liquation. Translated from Stahl u. Eisen, no. 35, 1922, p. 1346.

Manufacture and Use. Recent Progress in the Manufacture and Use of Alloys (Récents progrès dans la fabrication et l'utilisation des alliages), Léon Guillet. Journal de Physique et le Radium, vol. 4, no. 3, Mar. 1923, pp. 89-114, 19 figs. Discusses iron alloys, copper alloys, light alloys, including alloys of aluminum and magnesium, and some other alloys.

Tin-Antimony-Lead. Observations on the Tin-Antimony-Lead Alloys, R. W. Irwin. Chem., Met. & Min. Soc. of S. Africa—Jl., vol. 23, no. 9, Mar. 1923, pp. 171-174, 12 figs. on supp. plate. Results of investigations which have been carried out on alloys.

ALUMINUM ALLOYS

Alpax. Alpax, a New Aluminum Alloy (Un nouvel alliage d'aluminium: L'Alpax), Léon Guillet. Génie Civil, vol. 82, nos. 18 and 19, May 5 and 12, 1923, pp. 413-419 and 441-444, 33 figs. An aluminum-silicon alloy of about 13.5 per cent silicon, produced by special treatment; constitution; macrostructure and microstructure; chemical properties; properties of rolled and forged alpax; machining; tests made; industrial applications.

Aluminum Bronze. Aluminum Bronze as an Engineering Material, W. M. Corse. Can. Foundryman, vol. 14, no. 5, May 1923, pp. 31-32. Is essentially 90 to 92 parts of copper and 8 to 10 parts aluminum; its adaptability, machinability, manufacture, etc.; wrought aluminum bronze.

AMMONIA

Purification. Composition, Purification, and Certain Constants of Ammonia, E. C. McKelvy and C. S. Taylor. U. S. Bur. of Standards—Sci. Papers, vol. 18, no. 465, Mar. 9, 1923, pp. 655-693, 6 figs. Chemical tests made on several standard brands of commercial ammonia indicate that most commercial brands contain less than 0.1 per cent of impurities; 15 samples of purified ammonia were prepared by five different methods for use in determination of various thermodynamical properties of ammonia; these were found to contain less than 0.01 per cent of water and less than 0.001 per cent of other impurities.

Saturated Vapor, Specific Volume of. Specific Volume of Saturated Ammonia Vapor, C. S. Cragoe, E. C. McKelvy and G. F. O'Connor. U. S. Bur. of Standards—Sci. Papers, vol. 18, no. 467, Mar. 17, 1923, pp. 707-735, 4 figs. Measurements were made in temperature interval —50 to +50 deg. cent. by two methods; final results are expressed by means of empirical equation which forms basis of appended tables in metric and English units. Bibliography.

APPRENTICES, TRAINING OF

Problems. The Training of Apprentices. Foundry, vol. 51, no. 11, June 1, 1923, pp. 438-443. Contains articles on discussion of apprentice situation; problems in training; segregate apprentices; and application of time study to foundry operation.

AUTOMOBILE ENGINES

Cylinders. See CYLINDERS.

Scheel-Frontenac Racing. Scheel-Frontenac Entries Are Powered with Rotary Engines. Automotive Industries, vol. 48, no. 21, May 24, 1923, pp. 1120-1123, 7 figs. Describes engine of four cars entered for 500-mi. Indianapolis race; 4-cylinder stock design adapted to deliver 100 hp. at 5000 r. p. m. each valve controls both inlet and exhaust.

Spark Plugs. See SPARK PLUGS.

AUTOMOBILE MANUFACTURING PLANTS

Locomobile Co., Bridgeport, Conn. Improved Methods in Locomobile Shop, L. S. Love. Iron Age, vol. 111, no. 25, June 21, 1923, pp. 1763-1769, 19 figs. Economical arrangement of machines saves floor space and increases production; thread milling reduces costs; unusual turret-lathe fixtures.

Rover Co., Coventry, England. The Meteor Works of the Rover Company. Automobile Engr., vol. 13, no. 176, May 1923, pp. 144-149, 18 figs. Production methods and equipment of plant in Coventry, England, which turns out approximately 50 cars of 12-hp. model weekly.

AUTOMOBILES

Bodies. European Small-Capacity Body Form, Morris A. Hall. Automotive Manufacturer, vol. 65, no. 2, May 1923, pp. 7-11 and 28, 10 figs. European design of two, three and four-passenger automobile bodies.

Clutches. See CLUTCHES.

Headlights. Exterior Lighting of Automobiles (L'éclairage extérieur des automobiles), L. Bruninghaus. Revue Générale de l'Electricité, vol. 13, no. 17, Apr. 28, 1923, pp. 705-709, 6 figs. Discusses problem of lighting without objection of glare; describes some types of headlights and reflectors.

Mathis. The 8-12 Hp. Mathis. Auto-Motor Jl., vol. 28, no. 20, May 17, 1923, pp. 407-409, 9 figs. Details of two-seater car having four-cylindered engine; engine, clutch and gear of one unit; hand and foot brakes operating on rear wheels.

Packard. New Packard Has Eight-in-Line Engine and Four Wheel Brakes, J. Edward Schipper. Automotive Industries, vol. 48, no. 24, June 14, 1923, pp. 1266-1274, 12 figs. Is now in production with wheelbase lengths of 136 and 143 in. and nine body styles; will replace twin-six; engine resembles single-six in general design; reported to develop 85 hp. at 3000 r.p.m. and to be free from vibration.

Repair Service. Discussion of Papers at the Chicago Service Meeting. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 535-538. Discussion of following papers: Service and Its Relation to the Industry, Otis C. Funderburk; Maintenance Effects of Automotive Electrical-Equipment Standardization, A. H. Packer; Development of a Modern Service System.

S. P. A. The 20 Hp. S. P. A. Auto-Motor Jl., vol. 28, no. 18, May 3, 1923, pp. 365-368, 10 figs. Details of high-class Italian production; four-wheel braking; monobloc cylinders.

Springs. See SPRINGS, Leaf.

Standard. The 11 Hp. Standard Car. Auto-Motor Jl., vol. 28, no. 19, May 10, 1923, pp. 385-387, 6 figs. Details of car manufactured by Standard Motor Co., Ltd., England; 4-cylinder monobloc engine; roomy and fully equipped.

Star. The 11.9 Hp. Star Chassis. Automobile Engr., vol. 13, no. 176, May 1923, pp. 130-135, 12 figs. Details of engine, clutch, gear box, transmission, rear and front axle, steering and frame.

Steam Cars. A California Built Steam Motor Car. West. Machy. World, vol. 14, no. 5, May 1923, pp. 157-158, 7 figs. Describes Doble steamer and mechanical development of motor car with 100,000-mi. guarantee.

AVIATION

Germany. The Present Status of German Aviation (Die derzeitige Lage der deutschen Luftfahrt), F. Kasinger. Motorwagen, vol. 26, nos. 10, 11 and 12, Apr. 10, 20 and 30, 1923, pp. 151-153, 168-170 and 185-188. Recommendations for its maintenance.

Night Flying. Developing Equipment for Night Flying. Aviation, vol. 14, no. 22, May 28, 1923, pp. 578-581, 3 figs. How landing lights and high intensity searchlights are solving problem.

Night Flying (Les voyages de nuit en avion), Jean-Abel Lefranc. Nature (Paris), no. 2563, May 19, 1923, pp. 310-315, 9 figs. Activities of French lines, including Paris-Constantinople line; combined train and airplane travel; equipment of airplanes used.

Transoceanic. Commercial Ocean Transit by Air plane, E. R. Armstrong. Aviation, vol. 14, no. 23, June 4, 1923, pp. 602-606, 6 figs. Proposed service between New York and London, with capital cost estimates and operating expense.

AXLES

Motor-Truck. An Investigation of Some Heavy-Duty Truck Drive-Axles, S. von Ammon. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 517-534, 36 figs. Deals with mechanical efficiency of axles tested by Bur. of Standards; losses were separated into no-load and load losses, total loss being sum of these two.

Huck Double Reduction Truck Axle Employs Planetary Gears. Automotive Industries, vol. 48, no. 20, May 17, 1923, pp. 1076-1077, 1 fig. Designed also for bus applications; bevel pinion and gear is used for first reduction; second reduction is through epicyclic train.

B

BALANCING

Rotative. New Principles in Rotative Balance. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 562-564, 1 fig. Discussion of paper by Amos F. Moyer and author's reply.

Turbo-Alternator Rotors. Balancing of Rotors for Turbo-Alternators (Equilibrage des rotors de turbo-alternateurs), J. Bellisson. Revue Générale de l'Electricité, vol. 13, no. 17, Apr. 28, 1923, pp. 693-762, 23 figs. Dynamic balancing; examples of calculations from given data for given requirements.

BALANCING MACHINES

Developments. Recent Developments in Balancing Machines, Carl R. Soderberg. Mech. Eng., vol. 45, no. 6, June 1923, pp. 353-355 and 383, 6 figs. Describes efforts made to solve problem of balancing of small high-speed motors for domestic use; development of balancing machine that eliminates difficulties and makes it possible to manufacture quietly running motors. (Abridged.)

BEARINGS

Shaft, Power Losses in. Power Lost in Shaft Bearings, H. M. Brayton. Am. Mach., vol. 58, no. 24, June 14, 1923, pp. 861-863, 2 figs. Factors affecting friction losses; equations and chart for determining power losses; loose- and tight-fitting bearings and those under uniform pressure.

BEARINGS, BALL

Roller and. Underlying Principles of and Recent Experiences with Ball and Roller Bearings (Grundsätzliches und neue Erfahrungen an Kugel- und Rollenlagern), A. Riebe. Motorwagen, vol. 26, no. 4, Feb. 10, 1923, pp. 49-58, 19 figs. Discusses their use in automobile construction. Address read before (German) Automobile and Aeronautical Soc.

BEARINGS, ROLLER

Heavy-Duty. New Heavy Duty Roller Bearing, L. Cammen. Iron Age, vol. 111, no. 24, June 14, 1923, pp. 1708-1710, 8 figs. Floating axes of rolls designed to carry heavy mold in centrifugal casting machine; applicable to other machinery.

BELTING

Efficiency. Industrial Efficiency of Belting (Recherches sur le rendement industriel des courroies), M. Lahoussay. Revue de l'Industrie Minérale, no. 57, May 1, 1923, pp. 233-252, 15 figs. Results of experiments carried out at Conservatoire des Arts et Métiers with belting of various types for mine fan drive and factory use; properties; elasticity; coefficient of adherence.

Leather, Reclaiming. Reclaiming Leather Belts, Frank E. Gooding. Indus. Engr., vol. 81, no. 6, June 1923, pp. 304-309 and 324, 16 figs. Methods that may be used to reduce operating and maintenance costs by reusing discarded belts.

BLAST FURNACES

Banking. Banking a Blast Furnace. Iron Age, vol. 111, no. 23, June 7, 1923, p. 1629. New method tried out in Belgium; furnace banked 18 months. Abstracted from Revue Universelle des Mines, Nov. 15, 1922, p. 317.

Charging. The Charging of Blast Furnaces (Ueber Hochofen-Begichtung), T. An. Tesch. Stahl u. Eisen, vol. 43, no. 18, May 3, 1923, pp. 590-593, 7 figs. Principles underlying charging devices; hand, semi-automatic, and automatic charging.

Failure, Investigation of. Brick Column Lifts Furnace Top, G. M. Hohl. Iron Trade Rev., vol. 72, no. 25, June 21, 1923, pp. 1813-1819 and 1827, 15 figs. Shell rivets on Eastern Pennsylvania stack are sheared and entire top rigging elevated by excessive pressure caused by amorphous accumulation between wearing plates; investigation discloses important data.

BOILER FEEDWATER

Degasification. Degassing of Boiler Feedwater (Die Entgasung des Kesselspeisewassers), Heinrichs. Archiv fur Wärmewirtschaft, vol. 4, no. 3, Mar. 1923, pp. 41-44, 7 figs. Physical behavior of gases and water; methods of freeing water from gas by heating and by chemicals; describes preheating arrangements.

Soda Troubles. Manner of Avoiding Difficulties Caused by Soda in Boiler Feedwater (Les moyens d'eviter les inconvenients dus à la soude dans l'eau d'alimentation des chaudières), G. Paris. Génie Civil, vol. 82, no. 17, Apr. 28, 1923, pp. 392-394, 4 figs. Priming; corrosion of boiler plates, brass and bronze mountings, etc., and destruction of glass of level gages.

Treatment. Fuel Saving Aspect of Boiler Water Treatment, C. R. Knowles. Ry. Age, vol. 74, no. 25, May 26, 1923, pp. 1288-1289. Notes on scale; suspended matter; foaming; treatment, and treating plants in service.

The Contraflo System of Evaporation and Deaeration. Power Engr., vol. 18, no. 207, June 1923, pp. 213-215, 5 figs. Describes number of modern plants for special treatment of feedwater for high-duty boilers.

BOILER FURNACES

Oil-Burning Systems. The Clyde Oil Fuel Burning System. Engineer, vol. 135, no. 3519, June 8, 1923, pp. 611-614, 16 figs. partly on p. 608. Deals with detailed construction of several parts of plant installed in geared turbine steamship Fezara, and describes applications of Clyde system, both for marine and industrial uses.

BOILER OPERATION

Air Preheating. Preheating Air For Combustion (Le réchauffage de l'air de combustion), M. Nouhet. Revue de l'Industrie Minérale, no. 58, May 15, 1923, pp. 305-312, 10 figs. Utilization of waste heat in flue gases by applying to preheaters; describes various types of preheaters.

Efficiency. Improving Boiler Room Practice, Robert June. Gas Age-Rec., vol. 51, no. 15, Apr. 14, 1923, pp. 467-470, 9 figs. Use of cheaper coal; elimination of smoke; advantages of mechanical stokers; handling of stokers.

BOILERS

Corrosion. Corrosion Problems in Modern Plant

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 128

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Machy. Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Elec & Mfg. Co.
Weston Electrical Instrument Co.

Anchorages, Overhead Transmission
Midwest Steel & Supply Co.

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Babbit Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdy. & Mach. Co.
* Timken Roller Bearing Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Leatner
American Sole & Belting Leather Tanners (Inc.)

Belting, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Machy. Co.

Blocks, Tackle
Clyde Iron Works Sales Co
* Roebling's, J. A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Baffles
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Boiler Compounds
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Connelly, D. Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.
Link-Belt Co.

Bridgewalls (Furnace)
McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg Co.
* Jones, W. A. Fdry. & Mach. Co
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Cars, Charging
Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Breguet and René Devillers. Aérophile, vol. 31, no. 7-8, Apr. 1-15, 1923, pp. 102-106. Determination of ratio to be adopted between rupture charge of airplane wings and that to which they are usually subjected in flight; formulas and calculations.

AIRSHIPS

Hull Stresses, Balancing. Aircraft as an Engineering Problem, Ralph H. Upson. Mich. Technic, vol. 36, no. 3, Mar. 1923, pp. 5-7, 3 figs. Discusses balance of all forces acting on hull.

Inertia. The Inertia Coefficients of an Airship in a Frictionless Fluid, H. Bateman. Nat. Advisory Committee for Aeronautics—Report, no. 164, 1923, 16 pp., 3 figs. Investigation of apparent inertia of airship hull, and case of rotation of airship hull.

ALLOY STEELS

Developments. The Large Place Taken by Alloy Steels, J. Kent Smith. Iron Age, vol. 111, no. 23, June 7, 1923, pp. 1621-1623. Recent developments in connection with vanadium, chrome, tungsten and molybdenum; iron foundry progress with alloys.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Brass. See BRASS.

Bronze. See BRONZE.

Extra-Light. Magnesium and Extra-Light Alloys (Le magnesium et les alliages ultra-légers), A. Portevin. Société des Ingenieurs Civils de France—Procès Verbal, no. 8-9, Apr. 20, 1923, pp. 319-323. Properties of extra-light alloys, including magnesium; advantages, and utilization.

Liquation in. Liquation Phenomena in Metal Alloys, O. Bauer and H. Arndt. Brass World, vol. 19, nos. 4 and 5, Apr. and May 1923, pp. 103-107 and 160-162, 17 figs. Influence of velocity of cooling upon liquation of metals that form mixed crystals during cooling; explains "reversible" block liquation. Translated from Stahl u. Eisen, no. 35, 1922, p. 1346.

Manufacture and Use. Recent Progress in the Manufacture and Use of Alloys (Récents progrès dans la fabrication et l'utilisation des alliages), Léon Guillet. Journal de Physique et le Radium, vol. 4, no. 3, Mar. 1923, pp. 89-114, 19 figs. Discusses iron alloys, copper alloys, light alloys, including alloys of aluminum and magnesium, and some other alloys.

Tin-Antimony-Lead. Observations on the Tin-Antimony-Lead Alloys, R. W. Irwin. Chem., Met. & Min. Soc. of S. Africa—Jl., vol. 23, no. 9, Mar. 1923, pp. 171-174, 12 figs. on supp. plate. Results of investigations which have been carried out on alloys.

ALUMINUM ALLOYS

Alpax. Alpax, a New Aluminum Alloy (Un nouvel alliage d'aluminium: L'Alpax), Léon Guillet. Génie Civil, vol. 82, nos. 18 and 19, May 5 and 12, 1923, pp. 413-419 and 441-444, 33 figs. An aluminum-silicon alloy of about 13.5 per cent silicon, produced by special treatment; constitution; macrostructure and microstructure; chemical properties; properties of rolled and forged alpax; machining; tests made; industrial applications.

Aluminum Bronze. Aluminum Bronze as an Engineering Material, W. M. Corse. Can. Foundryman, vol. 14, no. 5, May 1923, pp. 31-32. Is essentially 90 to 92 parts of copper and 8 to 10 parts aluminum; its adaptability, machinability, manufacture, etc.; wrought aluminum bronze.

AMMONIA

Purification. Composition, Purification, and Certain Constants of Ammonia, E. C. McKelvy and C. S. Taylor. U. S. Bur. of Standards—Sci. Papers, vol. 18, no. 465, Mar. 9, 1923, pp. 655-693, 6 figs. Chemical tests made on several standard brands of commercial ammonia indicate that most commercial brands contain less than 0.1 per cent of impurities; 15 samples of purified ammonia were prepared by five different methods for use in determination of various thermodynamical properties of ammonia; these were found to contain less than 0.01 per cent of water and less than 0.001 per cent of other impurities.

Saturated Vapor, Specific Volume of. Specific Volume of Saturated Ammonia Vapor, C. S. Cragoe, E. C. McKelvy and G. F. O'Connor. U. S. Bur. of Standards—Sci. Papers, vol. 18, no. 467, Mar. 17, 1923, pp. 707-735, 4 figs. Measurements were made in temperature interval —50 to +50 deg. cent. by two methods; final results are expressed by means of empirical equation which forms basis of appended tables in metric and English units. Bibliography.

APPRENTICES, TRAINING OF

Problems. The Training of Apprentices. Foundry, vol. 51, no. 11, June 1, 1923, pp. 438-443. Contains articles on discussion of apprentice situation; problems in training; segregate apprentices; and application of time study to foundry operation.

AUTOMOBILE ENGINES

Cylinders. See CYLINDERS.

Scheel-Frontenac Racing. Scheel-Frontenac Entries Are Powered with Rotary Engines. Automotive Industries, vol. 48, no. 21, May 24, 1923, pp. 1120-1123, 7 figs. Describes engine of four cars entered for 500-mi. Indianapolis race; 4-cylinder stock design adapted to deliver 100 hp. at 5000 r. p. m. each valve controls both inlet and exhaust.

Spark Plugs. See SPARK PLUGS.

AUTOMOBILE MANUFACTURING PLANTS

Locomobile Co., Bridgeport, Conn. Improved Methods in Locomobile Shop, L. S. Love. Iron Age, vol. 111, no. 25, June 21, 1923, pp. 1763-1769, 19 figs. Economical arrangement of machines saves floor space and increases production; thread milling reduces costs; unusual turret-lathe fixtures.

Rover Co., Coventry, England. The Meteor Works of the Rover Company. Automobile Engr., vol. 13, no. 176, May 1923, pp. 144-149, 18 figs. Production methods and equipment of plant in Coventry, England, which turns out approximately 50 cars of 12-hp. model weekly.

AUTOMOBILES

Bodies. European Small-Capacity Body Form, Morris A. Hall. Automotive Manufacturer, vol. 65, no. 2, May 1923, pp. 7-11 and 28, 10 figs. European design of two, three and four-passenger automobile bodies.

Clutches. See CLUTCHES.

Headlights. Exterior Lighting of Automobiles (L'éclairage extérieur des automobiles), L. Bruninghaus. Revue Générale de l'Electricité, vol. 13, no. 17, Apr. 28, 1923, pp. 705-709, 6 figs. Discusses problem of lighting without objection of glare; describes some types of headlights and reflectors.

Mathis. The 8-12 Hp. Mathis. Auto-Motor Jl., vol. 28, no. 20, May 17, 1923, pp. 407-409, 9 figs. Details of two-seater car having four-cylindered engine; engine, clutch and gear of one unit; hand and foot brakes operating on rear wheels.

Packard. New Packard Has Eight-in-Line Engine and Four Wheel Brakes, J. Edward Schipper. Automotive Industries, vol. 48, no. 24, June 14, 1923, pp. 1266-1274, 12 figs. Is now in production with wheelbase lengths of 136 and 143 in. and nine body styles; will replace twin-six; engine resembles single-six in general design; reported to develop 85 hp. at 3000 r.p.m. and to be free from vibration.

Repair Service. Discussion of Papers at the Chicago Service Meeting. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 535-538. Discussion of following papers: Service and Its Relation to the Industry, Otis C. Funderburk; Maintenance Effects of Automotive Electrical-Equipment Standardization, A. H. Packer; Development of a Modern Service System.

S. P. A. The 20 Hp. S. P. A. Auto-Motor Jl., vol. 28, no. 18, May 3, 1923, pp. 365-368, 10 figs. Details of high-class Italian production; four-wheel braking; monobloc cylinders.

Springs. See SPRINGS, Leaf.

Standard. The 11 Hp. Standard Car. Auto-Motor Jl., vol. 28, no. 19, May 10, 1923, pp. 385-387, 6 figs. Details of car manufactured by Standard Motor Co., Ltd., England; 4-cylinder monobloc engine; roomy and fully equipped.

Star. The 11.9 Hp. Star Chassis. Automobile Engr., vol. 13, no. 176, May 1923, pp. 130-135, 12 figs. Details of engine, clutch, gear box, transmission, rear and front axle, steering and frame.

Steam Cars. A California Built Steam Motor Car. West. Machy. World, vol. 14, no. 5, May 1923, pp. 157-158, 7 figs. Describes Doble steamer and mechanical development of motor car with 100,000-mi. guarantee.

AVIATION

Germany. The Present Status of German Aviation (Die derzeitige Lage der deutschen Luftfahrt), F. Kasinger. Motorwagen, vol. 26, nos. 10, 11 and 12, Apr. 10, 20 and 30, 1923, pp. 151-153, 168-170 and 185-188. Recommendations for its maintenance.

Night Flying. Developing Equipment for Night Flying. Aviation, vol. 14, no. 22, May 28, 1923, pp. 578-581, 3 figs. How landing lights and high intensity searchlights are solving problem.

Night Flying (Les voyages de nuit en avion), Jean-Abel Lefranc. Nature (Paris), no. 2563, May 19, 1923, pp. 310-315, 9 figs. Activities of French lines, including Paris-Constantinople line; combined train and airplane travel; equipment of airplanes used.

Transoceanic. Commercial Ocean Transit by Airplane, E. R. Armstrong. Aviation, vol. 14, no. 23, June 4, 1923, pp. 602-606, 6 figs. Proposed service between New York and London, with capital cost estimates and operating expense.

AXLES

Motor-Truck. An Investigation of Some Heavy-Duty Truck Drive-Axles, S. von Ammon. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 517-534, 36 figs. Deals with mechanical efficiency of axles tested by Bur. of Standards; losses were separated into no-load and load losses, total loss being sum of these two.

Huck Double Reduction Truck Axle Employs Planetary Gears. Automotive Industries, vol. 48, no. 20, May 17, 1923, pp. 1076-1077, 1 fig. Designed also for bus applications; bevel pinion and gear is used for first reduction; second reduction is through epicyclic train.

B

BALANCING

Rotative. New Principles in Rotative Balance. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 562-564, 1 fig. Discussion of paper by Amos F. Moyer and author's reply.

Turbo-Alternator Rotors. Balancing of Rotors for Turbo-Alternators (Equilibrage des rotors de turbo-alternateurs), J. Bellisson. Revue Générale de l'Electricité, vol. 13, no. 17, Apr. 28, 1923, pp. 693-762, 23 figs. Dynamic balancing; examples of calculations from given data for given requirements.

BALANCING MACHINES

Developments. Recent Developments in Balancing Machines, Carl R. Soderberg. Mech. Eng., vol. 45, no. 6, June 1923, pp. 353-355 and 383, 6 figs. Describes efforts made to solve problem of balancing of small high-speed motors for domestic use; development of balancing machine that eliminates difficulties and makes it possible to manufacture quietly running motors. (Abridged.)

BEARINGS

Shaft, Power Losses in. Power Lost in Shaft Bearings, H. M. Brayton. Am. Mach., vol. 58, no. 24, June 14, 1923, pp. 861-863, 2 figs. Factors affecting friction losses; equations and chart for determining power losses; loose- and tight-fitting bearings and those under uniform pressure.

BEARINGS, BALL

Roller and. Underlying Principles of and Recent Experiences with Ball and Roller Bearings (Grundsätzliches und neue Erfahrungen an Kugel- und Rollenlagern), A. Riebe. Motorwagen, vol. 26, no. 4, Feb. 10, 1923, pp. 49-58, 19 figs. Discusses their use in automobile construction. Address read before (German) Automobile and Aeronautical Soc.

BEARINGS, ROLLER

Heavy-Duty. New Heavy Duty Roller Bearing, L. Cammen. Iron Age, vol. 111, no. 24, June 14, 1923, pp. 1708-1710, 8 figs. Floating axes of rolls designed to carry heavy mold in centrifugal casting machine; applicable to other machinery.

BELTING

Efficiency. Industrial Efficiency of Belting (Recherches sur le rendement industriel des courroies), M. Lahoussay. Revue de l'Industrie Minérale, no. 57, May 1, 1923, pp. 233-252, 15 figs. Results of experiments carried out at Conservatoire des Arts et Métiers with belting of various types for mine fan drive and factory use; properties; elasticity; coefficient of adherence.

Leather, Reclaiming. Reclaiming Leather Belts, Frank E. Gooding. Indus. Engr., vol. 81, no. 6, June 1923, pp. 304-309 and 324, 16 figs. Methods that may be used to reduce operating and maintenance costs by reusing discarded belts.

BLAST FURNACES

Banking. Banking a Blast Furnace. Iron Age, vol. 111, no. 23, June 7, 1923, p. 1629. New method tried out in Belgium; furnace banked 18 months. Abstracted from Revue Universelle des Mines, Nov. 15, 1922, p. 317.

Charging. The Charging of Blast Furnaces (Ueber Hochofen-Begichtung), T. An. Tesch. Stahl u. Eisen, vol. 43, no. 18, May 3, 1923, pp. 590-593, 7 figs. Principles underlying charging devices; hand, semi-automatic, and automatic charging.

Failure, Investigation of. Brick Column Lifts Furnace Top, G. M. Hohl. Iron Trade Rev., vol. 72, no. 25, June 21, 1923, pp. 1813-1819 and 1827, 15 figs. Shell rivets on Eastern Pennsylvania stack are sheared and entire top rigging elevated by excessive pressure caused by amorphous accumulation between wearing plates; investigation discloses important data.

BOILER FEEDWATER

Degasification. Degassing of Boiler Feedwater (Die Entgasung des Kesselspeisewassers), Heinrichs. Archiv fur Warmewirtschaft, vol. 4, no. 3, Mar. 1923, pp. 41-44, 7 figs. Physical behavior of gases and water; methods of freeing water from gas by heating and by chemicals; describes preheating arrangements.

Soda Troubles. Manner of Avoiding Difficulties Caused by Soda in Boiler Feedwater (Les moyens d'eviter les inconvenients dus à la soude dans l'eau d'alimentation des chaudières), G. Paris. Génie Civil, vol. 82, no. 17, Apr. 28, 1923, pp. 392-394, 4 figs. Priming; corrosion of boiler plates, brass and bronze mountings, etc., and destruction of glass of level gages.

Treatment. Fuel Saving Aspect of Boiler Water Treatment, C. R. Knowles. Ry. Age, vol. 74, no. 25, May 26, 1923, pp. 1288-1289. Notes on scale; suspended matter; foaming; treatment, and treating plants in service.

The Contraflo System of Evaporation and Deaeration. Power Engr., vol. 18, no. 207, June 1923, pp. 213-215, 5 figs. Describes number of modern plants for special treatment of feedwater for high-duty boilers.

BOILER FURNACES

Oil-Burning Systems. The Clyde Oil Fuel Burning System. Engineer, vol. 135, no. 3519, June 8, 1923, pp. 611-614, 16 figs. partly on p. 608. Deals with detailed construction of several parts of plant installed in geared turbine steamship Fezara, and describes applications of Clyde system, both for marine and industrial uses.

BOILER OPERATION

Air Preheating. Preheating Air For Combustion (Le réchauffage de l'air de combustion), M. Nouhet. Revue de l'Industrie Minérale, no. 58, May 15, 1923, pp. 305-312, 10 figs. Utilization of waste heat in flue gases by applying to preheaters; describes various types of preheaters.

Efficiency. Improving Boiler Room Practice, Robert June. Gas Age-Rec., vol. 51, no. 15, Apr. 14, 1923, pp. 467-470, 9 figs. Use of cheaper coal; elimination of smoke; advantages of mechanical stokers; handling of stokers.

BOILERS

Corrosion. Corrosion Problems in Modern Plant

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 128

Castings, Acid Resistant
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co

Castings, Brass
Du Pont Engineering Co.
* Edward Valve & Mfg. Co.

Castings, Die-Molded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Heavy
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
* Cole, R. D. Mfg. Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Royersford Fdry. & Mch. Co.
* U. S. Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)
* Edward Valve & Mfg. Co.

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
* Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Vogt, Henry Machine Co.

Castings, Steel
* Falk Corporation
Link-Belt Co.
Mackintosh-Hemphill Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Div.)

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Iron and Steel
Smooth-On Mfg. Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cement, Pipe Joint
Smooth-On Mfg. Co.

Cement, Water-Resistant
Smooth-On Mfg. Co.

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
Chain Belt Co.
* Diamond Chain & Mfg. Co
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corp'n

Charging Machines
Whiting Corp'n

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Cloth, Rubber
* Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works
Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Elect. Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co.
and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co.
and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring (Metal)
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.
Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co
* U. S. Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.
* Simplex Valve & Meter Co.

Converters, Steel
Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
* Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co
Link-Belt Co.

Conveyors, Ice
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co
* Schaeffer & Budenberg Mfg. Co and American Steam Gauge & Valve Mfg. Co Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Coupling, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falk Corporation
* Fawcus Machine Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
* Medart Co.
* Nordberg Mfg. Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Locomotive
* Brown Hoisting Machinery Co.
Link-Belt Co.
Whiting Corp'n

Cranes, Locomotive (Crawler)
Link-Belt Co.

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Equipment. Power House, vol. 16, no. 9, May 5, 1923, pp. 26–29. Basic principles of feedwater troubles; causes of corrosion from chemical standpoint and practical application of effective prevention in boilers and economizers.

Electrically-Heated. Electrically-Heated Boilers (Der elektrisch beheizte Dampfkessel), Wintermeyer. Elektrotechnischer Anzeiger, vol. 40, nos. 71 and 72, May 3 and 5, 1923, pp. 496–498 and 504–507. 2 figs. Resistance and electrode heating, advantages and drawbacks; economics of electric heating.

Largest in World. A Super Boiler, Albert L. Clark. Mich. Technic, vol. 36, no. 4, May 1923, pp. 17–18 and 30. 2 figs. Describes world's largest boiler installed in heating plant of Detroit Edison Co., with 2982 hp. and heating surface of 29,820 sq. ft.; stoker is Taylor three-plunger type, with 14 retorts on each side of boiler.

Locomotive. See LOCOMOTIVE BOILERS.

Power, A.S.M.E. Code for. Proposed Code for Care of Power Boilers. Mech. Eng., vol. 45, no. 6, June 1923, pp. 368–383. Preliminary report of subcommittee of A.S.M.E. Boiler Code Committee on rule for care of steam boilers and other pressure vessels in service. Second revision of A.S.M.E. boiler code, 1923.

Super-Pressure. Design Features of New 1200-lb. Boilers. Power Plant Eng., vol. 27, no. 12, June 15, 1923, pp. 637–638, 1 fig. Inclined header, cross-drum type boiler; forged steel drum with 4-in. walls; two superheaters used; one of which reheats exhaust from high-pressure turbine.

Temperature Control. The Control of Boilers, John B. C. Kershaw. Combustion, vol. 8, no. 4, Apr. 1923, pp. 226–231, 3 figs. Discusses interdependence of test results of CO_2 temperature and draft; and describes some of the latest indicating and recording instruments for making latter type of measurements.

Waste-Heat. Recent Developments in Connection with Gas-Fired Steam Boilers and the Utilization of Waste Heat for Steam-Raising Purposes, W. Gregson. Gas J., vol. 162, no. 3130, May 9, 1923, pp. 351–354 and (discussion) 354–355. Deals with steam production from gaseous fuels and from waste heat, describing gas-fired and waste-heat boilers, and their outstanding features.

Waste-Heat Boilers in Gas-Works Practice (Abhitzekessel im Gaswerksbetriebe), Paul Meyer. Gas- u. Wasserfach, vol. 66, no. 16, Apr. 21, 1923, pp. 219–221, 7 figs. Describes various types, including low-pressure boiler; horizontal waste-heat boiler for natural and artificial draft; horizontal double-draft boiler for artificial draft with controllable superheater; vertical boiler with preheater and superheater; horizontal and vertical waste-heat boilers with induced draft; etc.

Water-Tube. See BOILERS, WATER-TUBE

BOILERS, WATER-TUBE

Construction Defects. Constructional Defects in Water-Tube Boilers, R. Schirmer. Mech. Eng., vol. 45, no. 6, June 1923, pp. 365–366, 4 figs. Discusses causes of troubles with water-tube boilers, in particular those caused by ruptures of boiler walls. Translated from Warme, vol. 46, no. 2, Jan. 12, 1923, pp. 15–18, 4 figs.

Kestner. A New British Boiler, C. H. S. Tupholme. Combustion, vol. 8, no. 6, June 1923, pp. 370–373, 4 figs. Describes Kestner-Ransome type of boiler, employing waste heat together with its principles of operation.

BRASS

Melting and Pouring. Notes on Melting and Pouring Brass and Bronze, F. L. Wolf and Wm. Romanoff. Metal Industry (N. Y.), vol. 21, no. 6, June 1923, pp. 238–240. Essentials of good foundry practice as carried on in large modern plant; deals with pouring temperatures; comparison of melting furnaces; mixes; fluxes; and deoxidizers. Paper read before Am. Foundrymen's Assn.

Pressed. Advantages of Pressed Brass Parts (Was bietet die Verarbeitung gepreszter Messingteile fur Vorteile?), Richard Heinze. Werkstattstechnik, vol. 17, no. 9, May 1, 1923, pp. 263–265, 15 figs. Comparative data of pressed and cast pieces showing advantages of former.

BROACHING MACHINES

Hydraulically Operated. Hydraulic Operation of Ram Feature of New Broaching Machine. Automotive Industries, vol. 48, no. 24, June 14, 1923, pp. 1288–1289, 1 fig. Variable-pressure pump supplies oil pressure; useful life of broaches prolonged; broad range of speeds and feeds provided; developed by J. N. Lapointe Co., New London, Conn.

BRONZE

Antimony, Influence of. The Influence of Antimony on the Properties of Bronze (Einfluss des Antimons auf die Eigenschaften des Rotgusses), H. Czochralski. Giesserei-Zeitung, vol. 20, no. 7, Mar. 1, 1923, pp. 97–102, 24 figs. Investigation of influence of antimony additions on tensile strength, hardness, torsional strength, and resistance to shock of bronze; structure with different additions of antimony; no effect perceptible on working and casting qualities.

BUSHINGS

Bronze, Manufacture. Punch Presses Now Used Extensively in Manufacture of Bushings, Herbert Chase. Automotive Industries, vol. 48, no. 21, May 24, 1923, pp. 1132–1133, 4 figs. Type composed of steel shell with rolled and stamped bronze liner produced in large quantities; bore completely finished in one or two broaching operations.

C

CAR LIGHTING

Electric. Application of Automatic Control to Electric Train Lighting (Application du Régulateur automatique à l'éclairage électrique des Trains), V. Sylvestre. Houille Blanche, vol. 22, no. 75–76, Mar.-Apr. 1923, pp. 66–69, 6 figs. Characteristics and construction of Brown-Boveri equipment, consisting of an a. c. shunt dynamo, storage battery and regulator, applicable to individual cars or to trains.

Development of Electric Railway Car Lighting (Die Entwicklung der elektrischen Zugbeleuchtung), Hans Löwl. Elektrotechnik u. Maschinenbau, vol. 41, no. 13, Apr. 1, 1923, pp. 200–203, 9 figs. Brief description of different systems used on European railways; automatic system which uses an axle-driven d. c. generator of 300 watts to 3000 watts output connected over an electromagnetically-operated mechanism to battery of twelve cells.

CARS

Truck Design. Transverse Forces in Truck Side Frames in Curves, G. A. Anderson. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1423–1425, 4 figs. Analysis for determining stresses set up by wheel slippage, coupler pull and elevation of rail.

CARS, FREIGHT

Box. New Designs of Freight Cars for the Santa Fe. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1409–1413, 8 figs. Construction embodies new arrangement of side posts, underframe bracing, and door opener and closer.

Grain. Improved Type of Grain Car—South African Railways, W. E. Symons. Ry. & Locomotive Eng., vol. 36, no. 6, June 1923, pp. 188–191, 1 fig. Car is of steel construction with sole exception of inside grain doors; carrying cap., 80,000 lb.; weight, 40,210 lb.

Milk. Milk Car for the Boston & Maine. Ry. Age, vol. 74, no. 28, June 16, 1923, p. 1450, 1 fig. Details of milk car built by Laconia Car Co.

Ore. High-Capacity Ore Cars for the Great Northern. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1437–1438, 3 figs. Paying load is 81 per cent of gross weight; distinctive features of design.

Reinforced-Concrete. Reinforced-Concrete Railway Freight Cars (Die Eisenbahngüterwagen aus Eisenbeton), Max Gensbaur. Beton u. Eisen, vol. 21, nos. 5, 7 and 8, Mar. 5, Apr. 5 and 20, 1923, pp. 67–69, 91–93 and 107–110, 17 figs. Development of reinforced-concrete car construction in Europe and America; proposes to determine whether train of reinforced-concrete cars requires more coal than train of wood-iron cars; formation of cracks; tests of reinforced-concrete cars.

Steel. Reducing the Corrosion in Steel Cars, J. J. Tatum. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1427–1430, 7 figs. Steel containing small percentage of copper adopted to prevent rapid deterioration.

CARS, PASSENGER

Great Western Ry., England. New Main Line Express Trains, Great Western Railway. Ry. Gaz., vol. 38, no. 21, May 25, 1923, pp. 784–788, 9 figs. Trains made at Swindon Works are of advanced design, incorporating new features. Details of truck, equipment, dining cars, kitchen and pantry, brake power, lighting and safety appliances.

CARS, REFRIGERATOR

Model Tests. Tests on a Refrigerator Car Model, P. X. Rice. Ry. Mech. Engr., vol. 97, no. 6, June 1923, pp. 351–355, 14 figs. Experiments indicate that side-draft bunker system is superior to present arrangement of end bunkers.

CAST IRON

Characteristics. Some Characteristics of Cast-Iron, Robt. N. Richardson. Eng. Production, vol. 6, no. 129, June 1923, pp. 307–309. Expansion, contraction, and growth of cast iron in producing iron castings.

Hardness and Strength. The Relations between Tensile Strength, Hardness and Carbon in Cast Iron (Die Beziehungen zwischen Zugfestigkeit, Härte und gebundenem Kohlenstoff beim Gusseisen), Emil Schüz. Stahl u. Eisen, vol. 43, no. 22, May 31, 1923, pp. 720–722, 3 figs. Formula for relation of Brinell hardness to strength; relation to structure.

Melting, British Practice. Melting Iron in a British Shop, H. Cole Estep. Foundry, vol. 51, no. 12, June 15, 1923, pp. 475–478, 7 figs. Improved methods adopted by North of England rail-chair foundry have increased output 12 per cent and reduced labor costs $1800 a year; charges weighted accurately.

CASTING

Centrifugal. Centrifugal Casting of Iron Piston Rings, John A. Rathbone. Can. Foundryman, vol. 14, no. 5, May 1923, pp. 26–27 and 46, 3 figs. Use of cores; carbon precipitated as temper carbon on annealing; annealed metal proves excellent for pipe nipples; centrifugal casting of copper shell rings.

CENTRAL STATIONS

Canada. Central Electric Stations in Canada. Dept. Interior—Can., Water Resources Paper no. 33, Nov. 1, 1922, 479 pp., 22 figs. Directory of central stations; relation of central-station industry to water power; water-power resources of Canada; basis of computation; utilization of developed water power; water power in central-station and in pulp and paper industry; past and future growth in utilization of water power.

Development. Central Station Developments, C. W. Stone. Gen. Elec. Rev., vol. 26, no. 6, June 1923, pp. 325–327. General trend up to present time and future possibilities; author thinks public utilities in future may serve public by radio broadcasting of entertainments, etc.

Large, Data on. Data on Some Large Central Stations Recently Completed and Under Construction. Power, vol. 57, no. 22, May 29, 1923, 4-p. supp. sheet, and (editorial comment) p. 863. Tabulated data on steam and electrical equipment of 23 large central stations and 14 industrial power plants, including important values. Data show trend toward higher steam pressure, employment of reheating, feedwater heating by means of stage bleeding, use of electrical auxiliaries, and pulverized coal firing.

CHARTS

Routine. Routine Chart Construction, G. Charter Harrison. Management Eng., vol. 4, no. 6, June 1923, pp. 389–394, 5 figs. Describes what materials to use and what procedure to follow; advantages of using standardized methods.

CLUTCHES

Automobile. Notes on Clutch Design, F. A. Stepney Acres. Autocar, vol. 50, no. 1438, May 11, 1923, pp. 792–795, 5 figs. Work it must perform and features of construction which enable it to perform them satisfactorily.

COAL

Carbonization. Coal Carbonization and the World's Fuel, Horace C. Porter. Indus. & Eng. Chem., vol. 15, no. 4, Apr. 1923, pp. 335–338, 4 figs. Discusses possibilities of coal carbonization as solution of problem of slowly diminishing natural resources; difficulties involved, principally excessive costs of process, due to high expenditure of energy, heavy plant expense, and insufficient "form values" of its products; progress of industry in eliminating these difficulties, particularly possibilities of low-temperature carbonization processes in increasing "form value."

Recovery from Ashes. Recovery of Combustible Material From Coal Ashes. Paper Trade Jl., vol. 76, no. 14, Apr. 5, 1923, pp. 69–72, 6 figs. Description of Elmore hand jig, simple device to determine recovery value of ash pile, and its operation; ash is first screened to remove dust and finer particles, larger ones are crushed to pass through approximately 1½-in. round hole.

Specification. What Constitutes a Good Coal Specification? Russel G. Paddock. Power, vol. 57, no. 24, June 12, 1923, pp. 929–930. What should be included in specification and how it should be prepared.

COAL HANDLING

Automatic Railway. The Automatic Railway. Indus. Management (Lond.), vol. 9, no. 10, May 17, 1923, pp. 307–309, 2 figs. Discusses automatic gravity railway and concludes that it is not applicable for large and run-of-mine coal, but is useful for such small coal as is generally used in gas works.

COAL STORAGE

Winter Supply. Storing the Winter's Coal Supply, S. E. Balcome. Management Eng., vol. 4, no. 6, June 1923, pp. 377–380, 6 figs. Methods used by Graton & Knight Mfg. Co.

COKE

Foundry, Behavior in. Coke and its Behaviour in the Foundry, H. Koppers. Fuel in Sci. & Practice, vol. 2, no. 5, June 1923, pp. 160–165, 8 figs. Composition of coked fuel; process of combustion in blast furnaces and foundry cupolas; influence of coke on cast iron; combustibility of coke an important factor; slow-burning coke in foundry; proposals for new type of cupola.

COKE OVENS

Otto Regenerative. Compound Regenerative By-Product Coke Ovens. Iron & Coal Trades Rev., vol. 106, no. 2881, May 18, 1923, pp. 742–743, 4 figs. Feature of Otto coke oven is that it can be heated by coke-oven, producer or blast-furnace gas as independent firing medium, or by any mixture of such gases in any proportion; describes recent installation of battery of 10 ovens.

CONDENSERS, STEAM

Development and Practice. Steam Condenser Development and Practice, Frank G. Boyce and J. W. Mackenzie. Power Plant Eng., vol. 27, no. 11, June 1, 1923, pp. 588–591, 4 figs. Conductivity tests, methods of cleaning tubes and detecting causes of corrosion.

Ginabat Tube Arrangement. The Effect of Condensed Steam on the Efficiency of a Condenser. Mar. Engr. & Nav. Architect, vol. 46, no. 548, May 1923, pp. 171–172, 3 figs. Describes Ginabat condenser with improved tube arrangement invented by engineer in French Navy.

Tubes. Cleaning of Condenser Tubes (Die Reinigung der Kondensatorrohre), A. Sauermann. Glückauf, vol. 59, no. 18, May 5, 1923, pp. 437–440, 3 figs. Surface condensers in steam plants; effect of unclean tubes on fuel consumption; mechanical and chemical cleaning methods.

Tubes Made by Cast Shell Process. Mar. Rev., vol. 53, no. 6, June 1923, pp. 215–216, 6 figs. Notes on manufacture of marine condenser tubes at Bridgeport Brass Co.'s plant Bridgeport, Conn.

CONVEYORS

Bulk Materials. Bulk Materials Handling, and the Common Labor Shortage, Matthew W. Potts. Indus. Management (N. Y.), vol. 65, no. 6, June 1923, pp. 338–345, 8 figs. Describes types of bucket elevators and conveyors.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 128

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Ore and Rock
* Nordberg Mfg. Co.

Crushers, Roll
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cupolas
* Bigelow Co.
Northern Engineering Works
Whiting Corp'n

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
* Whitney Mfg. Co.

Cylinders Rebored
* Hooven, Owens, Rentschler Co.

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Diaphragms, Rubber
United States Rubber Co.

Die Castings
(See Castings, Die Molded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Thread Cutting
Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Drafting Room Furniture
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Drawing Instruments and Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Lidgerwood Mfg. Co.
* Morris Machine Works

Dredging Sleeve
United States Rubber Co.

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.
* Ingersoll-Rand Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
* Johns-Manville (Inc.)
Manufacturing Equip. & Engrg. Co.

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.
Link-Belt Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Philadelphia Drying Machy. Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
Clarage Fan Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.

Dyeing Machinery
Philadelphia Drying Machy. Co.

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Electrical Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Electrical Supplies
* General Electric Co.
* Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Elevators, Electric
Northern Engineering Works

Elevators, Hydraulic
Whiting Corp'n

Elevators, Passenger and Freight
Northern Engineering Works

Elevators, Pneumatic
Whiting Corp'n

Elevators, Portable
Link-Belt Co.

Elevators, Telescopic
Link-Belt Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
* Nordberg Mfg. Co.

Engine Stops
* Schutte & Koerting Co.

Engines, Blowing
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Westinghouse Electric & Mfg. Co.

Engines, Gasoline
Midwest Engine Corp'n
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
Clyde Iron Works Sales Co.
* Hooven, Owens, Rentschler Co.
* Lidgerwood Mfg. Co.
* Morris Machine Works
* Nordberg Mfg. Co.

Engines, Kerosene
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
* Nordberg Mfg. Co.
Sterling Engine Co.
* Ward, Chas. Engineering Wks.
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.

Engines, Marine, Steam
* Nordberg Mfg. Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
Otto Engine Works
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Nordberg Mfg. Co.
Sterling Engine Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
* Titusville Iron Works Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Leffel, James & Co.
* Troy Engine & Machine Co.
* Westinghouse Electric & Mfg. Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engine, Steam, High Speed
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engines, Steam, Throttling
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
Stumpf Una-Flow Engine Co. (Inc.)

Engines, Steam, Variable Speed
* Brownell Co.
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Exhaust Heads
Hoppes Mfg. Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
Clarage Fan Co.

Exhausters, Gas
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Extractors, Centrifugal
Tolhurst Machine Works

Extractors, Oil and Grease
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Machy. Co.

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Filters, Gravity
* Permutit Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Graver Corp'n
* Permutit Co.

Filters, Water
Elliott Co.
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* U. S. Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Steel
* Crane Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Pneumatic. Route Your Materials Via Air Line; F. L. Jorgensen. Chem. & Met. Eng., vol. 28, no. 21, May 28, 1923, pp. 932–938, 15 figs. Short study of art of pneumatic conveying; classification of various systems in use; examples of successful installations; how abrasives are handled.

COST ACCOUNTING

Factory. Underlying Principles of Industrial Cost Accounting (Grundzüge industrieller Kostenlehre), A. Walther. Schweizerische Bauzeitung, vol. 81, nos. 15, 17 and 18, Apr. 14, 28 and May 5, 1923, pp. 177–181, 201–205 and 222–224, 12 figs. Study of theory of cost accounting. Investigation of production costs.

Jobbing Shop. Cost Accounting in the Jobbing Shop, Ludwig B. Prosnitz. Machy. (N. Y.), vol. 29, no. 10, June 1923, pp. 794–797, 5 figs. Outlines simple system of keeping cost records especially adaptable to jobbing shop.

CRANES

Navy Yard, Propelling Gear for. Flexible Propelling Gear of Large Navy Yard Crane. Eng. News-Rec., vol. 90, no. 23, June 7, 1923, pp. 1004–1006, 5 figs. Special wheel support and drive for operation on curves and to carry great load on 22-ft. wheelbase.

Runways. Good Practice in the Design of Crane Runways, Robins Fleming. Eng. News-Rev., vol. 90, no. 21, May 24, 1923, pp. 918–920, 1 fig. Condensed discussion of impact effect, lateral stiffening, expansion, rail fastening and miscellaneous points.

Ship. U. S. Navy Crane Ship No. 1: An Achievement. Mech. Eng., vol. 45, no. 6, June 1923, pp. 333–341 and 399, 17 figs. Details of conversion of Battleship Kearsarge into titanic seagoing crane for handling loads of 250 tons; engineering problems encountered in dealing with stresses of unprecedented magnitude and how they were solved.

Slewing. Standard Steam Slewing Cranes and Their Application (Normale Dampfdrehkrane und ihre Verwendung), Benedict. Fördertechnik u. Frachtverkehr, vol. 16, no. 10, May 18, 1923, pp. 109–113, 23 figs. Design and construction of Demag cranes, including controlling devices for all operations; adaptable to variety of work.

Traveling. 80-Ton Traveling Cranes at the Bellinzona Locomotive Repair Shops of the Swiss Federal Railways. Int. Ry. Congress—Bul., vol. 5, no. 5, May 1923, pp. 497–498, 3 figs. Describes cranes made at Oerlikon Machine Works. Translated from Schweizerische Bauzeitung.

CRANKSHAFTS

Burnishing Bearings. Burnish Machine for Crankshaft Bearing, John E. Collins. Machy. (N. Y.), vol. 29, no. 10, June 1923, pp. 772–773, 2 figs. Machine that eliminates old hand method of scraping in crankshaft bearings of automobile engines, whole engine, so far as main bearings are concerned, is limbered up in one operation on this machine.

Machining. Modern Machining of Crankshafts (Neuzeitliche Bearbeitung von Kurbelwellen), J. Marretsch. Werkstattstechnik, vol. 17, no. 10, May 15, 1923, pp. 289–295, 27 figs. Complete procedure in machining of 6-cylinder shaft; holding device, drilling and milling machines; modern special machines, such as radial drilling machine, crankpin lathe, crankshaft grinding machine, thread-milling machine, etc.

Stresses In. Analysis of Stress in an Automobile Crankshaft, L. T. Rutledge. Can. Machy., vol. 29, no. 7, Feb. 15, 1923, pp. 20–22 and 36, 5 figs. Calculations based on shaft for 4-cylinder gasoline engine; diagrams showing various elements for maximum stresses; positive and negative bending moments combined; flexure stress; bending stress in arms; torsion and torsional stresses; thrust in connecting rod; effect of bearing friction.

CUPOLAS

Tap-Hole Troubles. Some Notes on Cupola Practice, with Special Reference to Tap-Holes. Foundry Trade Jl., vol. 27, no. 354, May 31, 1923, pp. 445–446, 6 figs. Discusses methods of avoiding trouble with tap holes, and dealing with leaks.

CYLINDERS

Automobile-Engine. Ford Principles and Practice at River Rouge, John H. Van Deventer. Indus. Management (N. Y.), vol. 65, no. 6, June 1923, pp. 359–368, 20 figs. Machine operations on Ford cylinders and Fordson pistons.

Making Automobile Cylinders. Eng. Production, vol. 6, no. 129, June 1923, pp. 303–307, 15 figs. Describes plant and methods of Westland Foundry, England.

D

DIES

Sectional. Sectional Blanking and Piercing Dies Machy. (Lond.), vol. 22, no. 554, May 10, 1923, pp. 171–175, 10 figs. Advantages of sectional dies and methods used in their construction.

DIESEL ENGINES

Cooling Water for. The Use of Cooling Water for Diesel Engines, J. G. Griffin. Diesel Engine Users Assn., no. S52, for meeting Apr. 13, 1923, 15 pp., including discussion. Notes on cooling-water systems; quantity of water required; scale troubles; formation, avoidance and removal of scale; water softening.

Design and Practice. Modern Diesel Engine Practice, J. H. Dyer. Roy. Engrs. Jl., vol. 37, no. 2, June 1923, pp. 280–286, 2 figs. Objects and modifications of design; fuel; limitations and advantages.

Mexican Fuel Oil. Mexican Fuel-Oil With Diesel Engines, A. B. Newell. Motorship, vol. 8, no. 5, May 1923, p. 350. Problems affecting use of 14 deg. B. boiler fuel.

DRILLING MACHINES

Cutting Speeds. Tables for Drill Cutting Speeds for Different Spindle Speeds. West. Machy. World, vol. 14, no. 5, May 1923, pp. 160–161. Table given out by Foote-Burt Co., Cleveland, O., for cutting speed in ft. per min.

Multiple-Spindle. Modern Working Arrangement for Multiple Spindle Drilling Machines for Plants (Neuzeitliche Bearbeitungsanlagen für dan paketweise Bohren von Schiffsplatten), Hugo Becker. Schiffbau, vol. 24, no. 23–24, Mar. 7–14, 1923, pp. 369–375, 9 figs. Describes various types by Schiess A. G., including a 32-spindle electric-driven machine for ship plates.

Multiple-spindle Group Drilling Machine. Machy. (Lond.), vol. 22, no. 555, May 17, 1923, pp. 197–200, 6 figs. Examples of standardized unit construction, primarily intended for repetition drilling operations on metal details used in connection with railway-car industry.

Radial. Girder Radial Drilling Machine. Machy. (Lond.), vol. 22, no. 555, May 17, 1923, pp. 217–219, 7 figs. Machine for drilling operations on girder and structural work, boiler and tank plates, and ship, locomotive and car work.

Vertical. A New Box Body Vertical Drilling Machine. Brit. Machine Tool Eng., vol. 2, no. 21, May-June 1923, pp. 636–640 and 643, 11 figs. Details of Asquith high-speed vertical machines.

DROP FORGING

Automobile Parts. Forging Practice for Automobile Parts, R. T. Herdegen. Am. Soc. Steel Treating—Trans., vol. 3, no. 8, May 1923, pp. 841–846 and (discussion) 846–850. Discusses various types of machines used in production of drop forgings both in eastern and western shops; items or factors which go to make up total cost of manufacture.

Cut-Off. Early History of the Cut-Off, R. C. Jennings. Forging & Heat Treating, vol. 9, no. 5, May 1923, pp. 219–221, 8 figs. History and development; accidental discovery of pass-by cut-off an important factor in drop-forging industry.

DYNAMOMETERS

Transmission. Dynamometers and the Measurement of Power, J. Lewis. Electricity, vol. 37, no. 1695, May 4, 1923, pp. 227–228, 2 figs. Notes on absorption and transmission dynamometers; methods of using dynamo as transmission dynamometer.

E

ECONOMIZERS

Care and Operation. Care and Operation of Fuel Economizers, H. M. Guilbert. Power Plant Eng., vol. 27, no. 11, June 1, 1923, pp. 567–569, 2 figs. Notes on interior corrosion; steel tube economizers; prevention of corrosion; operating points.

EDUCATION, ENGINEERING

Coöperative. Developments in Co-operative Engineering Courses, R. L. Sackett. Eng. News-Rec., vol. 90, no. 24, June 14, 1923, pp. 1050–1051. Review of various alternate industry and class-room courses given in different American colleges.

Opportunity in. The Opportunity in Engineering Education, William E. Bullock. Eng. Education, vol. 13, no. 9, May 1923, pp. 566–570. Points out that principal requirement today is not for technical design but rather for opportunity to get designs into production; and engineering education must deal not only with engineering design, but with public and economic life which student must soon enter.

EDUCATION, INDUSTRIAL

Promoting. Promoting Industrial Education, Harold C. Smith. Iron Trade Rev., vol. 72, no. 24, June 14, 1923, pp. 1749–1750 and 1760. Efforts of Nat. Assn. of Mfrs. resulting in large number of establishments training their own workers; practical work done to assist members; make plan to fit shop.

ELECTRIC FURNACES

Ironless Induction. Conversion of Electromagnetic Energy Into Useful Heat, E. F. Northrup. Forging & Heat Treating, vol. 9, no. 5, May 1923, p. 228. Describes high-frequency induction furnace invented by author and used, in its smaller sizes to melt precious metals and their alloys, and samples of carbonless iron and its alloys; in its larger sizes, silver and base non-ferrous metals and their alloys are melted, also nickel and iron alloys.

Large Melting. Development of the Large Electric Melting Furnace, Frank Hodson. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 6, June 1923, pp. 600–604, 4 figs. Developments; limitations of large electrode furnaces; design and construction of largest electric melting furnace ever built; advantages of correct heat application; influence of new Soderberg continuous electrode on furnace design; possibility of using large electric furnaces as intermediate process for manufacture of cheap steel.

Types. The Use of Electric Furnaces in Alloy Foundries and for Heat Treatment (L'emploi du four électrique en fonderies d'alliages et dans les traitements thermiques). Métallurgie, vol. 55, no. 20, May 17, 1923, pp. 717–718. Application of induction and arc furnaces, including Morgan, Ajax, Westinghouse, and other types.

ELECTRIC LOCOMOTIVES

Comparison with Steam. The Case for the Electric Locomotive, H. R. Halloran. New Zealand Jl. Sci. & Technology, vol. 5, no. 6, Mar. 1923, pp. 336–346. Notes on relative merits of steam and electric traction, with reference to recent publications on improvements in performance of electric locomotives in comparison with steam locomotives.

European Design. Some Details of European Electric Locomotives, H. A. Kjelsberg. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1417–1418, 3 figs. Clearances and other physical limitations greatly affect design of motive power.

Japanese Government. British Electric Locomotives for Japanese Government Railways. Ry. Age, vol. 74, no. 25, May 26, 1923, pp. 1280–1281, 1 fig. Design of freight and passenger locomotives delivered by English Elec. Co., of 0-4-4-0 and 4-6-6-4 types respectively. See also Tramway & Ry. World, vol. 53, no. 23, May 10, 1923, pp. 225–227, 5 figs.

Swedish. The New A.S.E.A. Locomotives for the Riksgräns Railway (Die neuen Asea-Lokomotiven fur die Riksgränsbahn), Paul Friebel. Elektrotechnik u. Maschinenbau, vol. 41, no. 16, Apr. 22, 1923, pp. 241–246, 15 figs. Details of freight locomotives type 0-D-0 and express locomotives type 2-B-B-2, built by Allmänna Svenska Elektriska Aktiebolaget, Västeras; weight respectivey 68.6 and 123.2 tons; 16,000 volts 15 cycle.

Virginian Railway. Locomotives for the Virginian Electrification, R. L. McClellan. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1451–1453, 5 figs. Will handle 6000 tons over mountains and 9000 tons on down grade; construction details.

ELECTRIC WELDING

Applications. Electric Welding, Wm. Mason. Metal Industry (Lond.), vol. 22, no. 20, May 18, 1923, pp. 497–499, 5 figs. Describes important applications of electric welding, and foresees considerable development in application of process to construction and maintenance of machinery.

Oil Storage Tanks. Welding Oil Storage Tanks. Welding Engr., vol. 8, no. 5, May 1923, pp. 25 and 28–29, 11 figs. Bottoms and roofs are welded for containers having storage capacity of 80,000 bbl. of oil.

Railway Shops. Electric Welding in Railway Shops, W. E. Symons. Ry. & Locomotive Eng., vol. 36, no. 6, June 1923, pp. 169–175, 8 figs. Its application and use in locomotive construction and repair.

ELECTRIC WELDING, ARC

Boilers and Condensers. Arc Welding in the Manufacture of Condensers and Steam Boilers (Die Lichtbogenschweissung bei der Fabrikation von Behältern und Dampfkesseln), Fr. W. Achenbach. Wärme, vol. 46, nos. 16 and 17, Apr. 20 and 27, pp. 161–164 and 177–178, 20 figs. As result of successful repairs, proposes production by steam method; vaporization of condensers and small steam boilers; application of same methods to large steam boilers, locomotive boilers, etc.

ELEVATORS

Controllers. Operation of Gearless Traction Elevator Controller, Wm. Zepernick. Power, vol. 57, no. 23, June 5, 1923, pp. 886–892, 7 figs. Describes controller for slow-speed elevator motor developed and used by Otis Elevator Co.

Interlocks. Electro-Mechanical Interlocks, C. W. Bassett. Safety Eng., vol. 45, no. 4, Apr. 1923, pp. 122–125, 7 figs. Outline of general functions and advantages of electric-contact and electromechanical devices.

EMPLOYEES' REPRESENTATION

Bethlehem Plan. Five Years of Employee Representation Under "The Bethlehem Plan," John Calder. Iron Age, vol. 111, no. 24, June 14, 1923, pp. 1689–1697. Beginnings of plan; representation basis; unique feature of Bethlehem plan; industrial-relations department; how plan functions; president's participation; issues raised by employees; lessons for steel industry.

EMPLOYMENT MANAGEMENT

Centralized Employment. Experiences with Centralized Employment, Arthur Notman. Min. & Metallurgy, vol. 4, no. 198, June 1923, pp. 300–302, First step in centralized employment, and present labor situation at Phelps Dodge Corp., Bisbee, Ariz.

ENGINEERING

Abstract Science Applied to. The Interdependence of Abstract Science and Engineering, Richard T. Glazebrook. Engineering, vol. 115, nos. 2993 and 2994, May 11 and 18, 1923, pp. 599–602 and 633–636, 13 figs. Deals with organization, methods and application of engineering research, and refers in detail to applications of abstract science to various branches of engineering, including radiotelegraphy, properties of materials, lubrication, aeronautics, internal-combustion engine and steam turbine. Lecture before Instn. Civil Engrs. See also Engineer, vol. 135, no. 3515, May 11, 1923, pp. 502–504.

Human, Foundation of. The Foundation of Human Engineering, Walter N. Polakov. Management Eng., vol. 4, no. 5, May 1923, pp. 345–348. Discusses language of new mathematical logic; points out that mathematics may deal with non-quantitative problems; definition of "human engineering"; true, false, and meaningless propositions; mathematics in daily life. Bibliography.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 128

Flanges
* American Spiral Pipe Works
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flooring, Rubber
United States Rubber Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Co.
* Nordberg Mfg. Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Furnace & Burner Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Foundry Equipment
Northern Engineering Works
Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Whiting Corp'n

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Detroit Electric Furnace Co.
Kenworthy, Chas F. (Inc.)

Furnaces, Forging
Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
Kenworthy, Chas F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
Detroit Electric Furnace Co.
* General Electric Co.
Whiting Corp'n

Furnaces, Non-Ferrous
Detroit Electric Furnace Co.

Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co.
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
* Johns-Manville (Inc.)

Gage Boards
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Glasses
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gage Testers
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Altitude
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Ammonia
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Gages, Differential Pressure
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Draft
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Gages, Liquid Level
* Bristol Co.
* Lunkenheimer Co.
* Precision Instrument Co
* Simplex Valve & Meter Co.

Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
* Norma Co. of America

Gages, Pressure
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gages, Water Level
* Bristol Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge and Valve Mfg. Co. Division
* Simplex Valve & Meter Co.

Gas Analysis Apparatus
* Precision Instrument Co. (Inc.)

Gas Collectors
* Precision Instrument Co. (Inc.)

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Iron, Corrugated
Smooth-On Mfg. Co.

Gaskets, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Gasoline
Texas Co.

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.

Gears, Cut
Brown, A. & F. Co.
Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Philadelphia Gear Works
* Poole Engrg. & Mch. Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Herringbone
* Falk Corporation

Gears, Machine Molded
Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.
Philadelphia Gear Works

Gears, Speed Reduction
* De Laval Steam Turbine Co.
* Falk Corporation
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.
Link-Belt Co.
* Poole Engrg. & Mach. Co.
* Westinghouse Electric & Mfg. Co.

Gears, Worm
Chain Belt Co.
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Westinghouse Electric & Mfg. Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Governors, Engine, Oil
* Nordberg Mfg. Co.

Governors, Engine, Steam
* Nordberg Mfg. Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Kieley & Mueller (Inc.)

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Springfield Boiler Co.
* Titusville Iron Works Co.
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Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

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Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
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Brown, A. & F. Co.
* Smidth, F. L. & Co.

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Hammers, Pneumatic
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Link-Belt Co.
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* Royersford Fdry. & Mach. Co.
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Hangers, Shaft (Ball Bearin
* Hyatt Roller Bearing Co.
* S K F Industries (Inc.)

Hangers, Shaft (Roller Bearing)
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mach. Co.

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* American Metal Treatment Co.

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* American Metal Treatment Co.

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* Walsh & Weidner Boiler Co.
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* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

ENGINEERS

License Laws. Fifteen Years of the Engineering License Law in Louisiana, Donald Derickson. La. Eng. Soc.—Proc., vol. 9, no. 1, Feb. 1923, pp. 12–33, 7 figs. Experience resulting from nearly 15 years under state law to regulate practice of civil engineering and surveying.

Why One Engineers' Registration Law Was Not Enacted, Arthur Richards. Eng. News-Rec., vol. 90, no. 23, June 7, 1923, pp. 992–993. Comments on license laws in general and on proposed law in Ohio in particular.

EXECUTIVES

Scientific Method for. The Scientific Method for Executives, Wallace Attwood. Indus. Management (Lond.), vol. 9, nos. 9, 10 and 11, May 3, 10 and 17, 1923, pp. 267–269, 301–303 and 337, 1 fig. May 3 Analysis of scientific principles governing efficient industrial administration. Applying scientific method.

F

FATIGUE

Industrial. Industrial Fatigue. Times Trade & Eng. Supp., vol. 12, no. 254, May 19, 1923, p. 226. Abstract of statement submitted by secretary of Indus. Fatigue Research Board to Statistical Soc. on recent developments in Board's work and its prospects.

FEEDWATER HEATERS

Locomotive. Locomotive Feedwater Heaters (Réchauffeurs d'eau d'alimentation pour locomotives) Edouard Sauvage. Société d'Encouragement Pour L'Industrie Nationale, vol. 135, no. 4, Apr. 1923, pp. 299–310, 10 figs. Design, construction and operation of various types.

FIRE PROTECTION

Sprinklers. A New Calcium Chloride Sprinkler System. Nat. Fire Protection Assn.—Quarterly, vol. 16, no. 3, Jan. 1923, pp. 267–275, 1 fig. Describes system of automatic sprinklers using non-freezing calcium-chloride solution, supplied by four 50,000-gal. gravity tanks in towers of Montreal cold-storage warehouse.

FLIGHT

Coast to Coast, U. S. The Marine Corps Flight from Coast to Coast. Aviation, vol. 14, no. 23, June 4, 1923, pp. 607–608. Report on formation flight of four Martin bombers from San Diego, Cal., to Quantico, Va.

Motorless. Engineless Flying (Der motorlose Flug). R. Katzmayr. Zeit. des Oesterr. Ingenieur- u. Architekten-Vereines, vol. 75, no. 17–18, May 4, 1923, pp. 97–100, 3 figs. Discusses wind-propelled flight as against gliding flight steered by wind; describes airplanes used.

FLOW OF AIR

Measurement. Experiments Develop New Constants in Air Flow Measuring Formulae, Johnstone Taylor. Automotive Industries, vol. 48, no. 21, May 24, 1923, pp. 1126–1128, 3 figs. Venturi and orifice methods have been revised considerably as result of recent studies; latter involves use of somewhat simpler apparatus, consisting of tin plate with circular opening, U-tube, and air receiver.

FLOW OF FLUIDS

Pipes. Orifice Coefficients—Data and Results of Tests, Jacob M. Spitzglass. Mech. Eng., vol. 45, no. 6, June 1923, pp. 342–346 and (discussion) 346–348 and 399, 7 figs. Results of experimental work conducted at research laboratory of Republic Flow Meters Co., Chicago, on use of orifice plates for measuring flow of fluids in pipes; tests were conducted on seven sizes of pipes, from 2-in. to 12-in. standard. Includes number of tables and characteristic curves that may be employed for determining flow through orifice plates in given size of pipe. (Abridged.)

FLOW OF STEAM

Pipes. The Flow of Steam in Pipes, W. Mason. Chem. Trade Jl. & Chem. Engr., vol. 72, no. 1880, June 1, 1923, p. 666. Simplification of Unwin's formula and table showing its application; examples showing use of logarithmic chart.

FLUE GASES

Cinder Collection from. Collecting Cinders from Flue Gases, L. B. Salt. Combustion, vol. 8, no. 6, June 1923, pp. 384–387, 5 figs. Development of cinder-collection fan; action of fan.

FORGING

Non-Ferrous Metals. The Die Forging of Non-Ferrous Metals (Das Pressen von Nichteisen-Metallen), A. Pfeil. Zeit. für Metallkunde, vol. 15, nos. 1 and 2, Jan. and Feb. 1923, pp. 1–6 and 41–47, 54 pp. Development of hot forging process; useful scope of pressed pieces; qualities of pressed metals and alloys; directions for design of pressed pieces; tolerances; types of swages; machines and methods for hot forging; economy of process.

Shells. Closing-In Seven Inch Shell Forgings, W. R. Ward. Forging & Heat Treating, vol. 9, no. 5, May 1923, pp. 212–214, 5 figs. Detailed description outlining how experimental equipment was changed over for production work; novel arrangement for jib crane eliminates many operations.

FOUNDRIES

Aluminum. A New Aluminum Foundry, Seymour Pile. Metal Industry (Lond.), vol. 22, no. 22, June 1, 1923, pp. 554–556, 3 figs. Equipment and methods of Birmingham Aluminum Casting Co.

British Practice. Foundry Practice in Britain, Percy Longmuir. Foundry, vol. 51, no. 12, June 15, 1923, pp. 497–501, 2 figs. Metallurgical features of ferrous and non-ferrous metals are discussed and typical analyses presented to show effect of melting and heat-treating metals at varying temperatures. Paper presented before Am. Foundrymen's Assn.

Cost Accounting. Cost Accounting of Foundry Labor, F. C. Everitt and Johnson Heywood. Iron Age, vol. 111, no. 24, June 14, 1923, pp. 1701–1704. 6 figs. Outline of procedure and blank forms for small and large foundries.

Malleable-Iron. Points on Malleable Iron Foundry Practice. Can. Foundryman, vol. 14, no. 5, May 1923, pp. 28–30, 2 figs. Two articles: Malleable Iron Cast in Small Quantities, by S. J. Felton; Checking Malleable Foundry Scrap, by E. D. Halsey.

Match Plates. Double Face Aluminum Plates, James Hines. Foundry, vol. 51, no. 12, June 15, 1923, pp. 505–506. Advantages of using method for increasing production; describes how foundryman may mold and cast plates in his own shop.

Material-Handling Equipment. The Handling of Loads in Iron Foundries (Heben und Befördern von Lasten in Eisengiessereien), Carl Rein. Giesserei-Zeitung, vol. 20, no. 10, Apr. 15, 1923, pp. 167–176, 21 figs. Discharge and storage of raw material; furnace charging; lifting and conveying of loads to molding and cleaning shops.

FUEL ECONOMY

Power Plants. Fuel Economy and Production Expenses, Allen M. Perry. Elec. World, vol. 81, no. 22, June 2, 1923, pp. 1259–1262. Data for 45 coal-burning plants ranging from 10,000 to 122,000 kw.

Railways. Fuel—A Reducible 13 Per Cent of Expense, J. Kruttschnitt. Ry. Age, vol. 74, no. 25, May 26, 1923, pp. 1277–1290. Comprehensive review of present fuel situation and future outlook. (Abstract.) Address before Int. Ry. Fuel Assn. See also Ry. Rev., vol. 72, no. 21, May 26, 1923, pp. 877–884.

FUELS

Drying. Drying of Moist Fuels Outside of the Furnace, Zuce Kogan. Power Plant Eng., vol. 27, no. 12, June 15, 1923, pp. 619–622, 7 figs. Points out that atmospheric drying will be found economical when using fuels with high moisture content.

Gaseous. The Combustion of Gaseous Fuels, George F. Moulton. Indus. & Eng. Chem., vol. 15, no. 6, June 1923, pp. 583–587, 6 figs. Presents figures showing how injection of primary air in gas burners is modified by variations in gas rate, pressure, and specific gravity, resulting in different types of flame.

Recovery from Ashes. The Separation and Recovery of Fuel, Alwyne Meade. Gas Engr., vol. 39, no. 565, May 1923, pp. 105–108, 7 figs. Economics of fuel separation; construction and operation of Blackett washer and other machines; disadvantages of wet separation; separation by frictional resistance.

[See also COAL; COKE; OIL FUELS; PULVERIZED COAL.]

FURNACES, ANNEALING

Recuperative. Practice on Recuperative Annealing Furnaces, Karl G. Gustafsson. Iron Age, vol. 111, no. 25, June 21, 1923, pp. 1782–1783, 2 figs. Pot furnace designed to act as simple producer; high economy claimed compared with oil-fired apparatus.

FURNACES, HEAT-TREATING

Combustion. Combustion as it Pertains to Industrial Heat Treatment Furnaces, A. D. Frydendall. Am. Soc. Steel Treating—Trans., vol. 3, no. 8, May 1923, pp. 824–832. Discusses luminous and non-luminous flames as met with in use of common fuel gases; deals with various types of fuels commonly met with and used in industrial heating, and points out advantages and disadvantages of various types; points of prime importance in efficient operation and handling of fuels in heating materials.

Electrically Heated. Heat Treat To Remove Strains, Pat Dwyer. Iron Trade Rev., vol. 72, no. 24, June 14, 1923, pp. 1743–1748, 5 figs. Large turbine frames and other castings of similar character are heat-treated in special electrically heated oven in which casting is raised to approximately 700 deg. fahr.

Heating, Hardening and Tempering. Modern Heating, Hardening and Annealing Furnaces, O. Dähne. Eng. Progress, vol. 4, no. 5, May 1923, pp. 91–93, 7 figs. Notes on plate, double-chamber, and tempering furnaces; tongs and tongs racks.

G

GAGES

Cylinder Inspection. Cylinder Inspection Gages, Frank C. Hudson. Am. Mach., vol. 58, no. 21, May 24, 1923, pp. 769–770, 6 figs. Methods used by two leading automobile builders for insuring accuracy in cylinder production; sight and feel gages popular in this work.

GALVANIZING

Hot-Dip. Effects of Hot-Dip Galvanizing, W. R. Bean. Foundry, vol. 51, no. 11, June 1, 1923, pp. 447–455, 18 figs. Malleable shown by research not to be deteriorated by this process when phosphorus and silicon are low; high-phosphorus irons will be embrittled by galvanizing; details of experience.

GAS PRODUCERS

Developments. Recent Developments in Gas Producers, T. Roland Wollaston and A. L. Booth. Chem. & Industry, vol. 42, no. 19, May 11, 1923, pp. 200T–203T, 1 fig. Describes new plant running on semi-coked coal, feature of which is freedom of gas from dust.

GAS TURBINES

Theory and Practice. The Gas Turbine in Theory and Practice. Engineer, vol. 135, nos. 3514, 3515, 3516, 3517, 3518, 3519 and 3520, May 4, 11, 18, 25, June 1, 8 and 15, 1923, pp. 466–468, 490–491, 515–517, 557–559, 583–584, 595–598 and 630–632, 16 figs. Consideration of role which internal-combustion turbine could or might fill; review of development and its possible scope. Practical experience with gas turbine. Tendencies caused by variation of cycle limits. Constant-volume turbine; Holzwarth turbine.

GEAR CUTTING

Hobbing Machines. Simplicity of Indexing Mechanism Features New Gear Hobber. Automotive Industries, vol. 48, no. 21, May 24, 1923, pp. 1124–1125, 1 fig. Product of Cincinnati Gear Cutting Machine Co. permits continuous production of single design with great accuracy; cutter head fixed; allows cutting of 4 diametral pitch teeth.

Machines. Spiral Bevel Gear-cutting Machine. Machy. (Lond.), vol. 22, no. 554, May 10, 1923, pp. 183–184, 3 figs. Describes tooth-cutting machine invented by N. G. Gwynne.

Worm Gears. Cutting Worm-Gears, Franklin D. Jones. Machy. (N. Y.), vol. 29, no. 10, June 1923, pp. 784–789, 9 figs. Use of ordinary hob and radial in-feed; fly-cutter method; use of tapering hobs.

GEARS

Bevel. Considering the Advantages of Spiral Bevel Gears. Can. Machy., vol. 29, no. 20, May 17, 1923, pp. 29 and 44. Applications and advantages; continuous pitch-line contact; smooth and quiet operation; right and left spirals; vibration reduced to a minimum.

Grinding Teeth of. Gear-Grinding and Tooth-Forms, Glenn Mufflly. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 545–555 and (discussion) 555–559, 25 figs. Shows how gear teeth are being ground within new limit of accuracy in regular production and how minute errors in tooth curves and spacing may be measured.

Industrial. The Modern Industrial Gear, W. H. Phillips and L. F. Burnham. Engrs.' Soc. West. Pa.—Proc., vol. 39, no. 1, Feb. 1923, pp. 19–35 and (discussion) 36–43, 11 figs. Notes on design, material and heat treatment, manufacture, inspection, installation and maintenance.

Machine-Cut. Power Transmission through Machine-Cut Gearing, W. H. Child. S. African Instn. Engrs.—Jl., vol. 21, no. 8, Mar. 1923, pp. 155–165 and (discussion) 165–167, 4 figs. Notes on rolling-mill, winding and haulage, and turbine gear.

Standardization. Progress in Gear Standardization Am. Mach., vol. 58, no. 25, June 21, 1923, p. 97. Résumé of work accomplished by subcommittee of American Gear Mfrs.' Assn. since October 1922.

Testing. Dial Gage Device Used with Success to Test Spiral Bevel Gears, P. M. Heldt. Automotive Industries, vol. 48, no. 20, May 17, 1923, pp. 1088–1089, 4 figs. Machine developed to determine inaccuracy of tooth outline and errors of indexing adapted to check correctness of curvature.

Gear Testing (Zahnräderprüfung), Mad Kurrein. Werkstattstechnik, vol. 17, no. 8, Apr. 15, 1923, pp. 225–232, 29 figs. Describes various types of testing apparatus.

Use of. Gears and Speed Reducers, G. A. Van Brunt. Indus. Engr., vol. 81, no. 3, Mar. 1923, pp. 131–137, 20 figs. Practical information, together with directions for ordering them.

GLUES

Polishing Work, Use in. Glue in Polishing Work, B. H. Divine. Metal Industry (N. Y.), vol. 21, no. 6, June 1923, pp. 234–235. Notes on glue room; wheel drying; proper glue; melting soaked glue; applying glue to polishing wheel; overheating glue; etc. (Abstract.) Paper read before Meriden Branch, A.S.M.E.

GRAIN HANDLING

Pneumatic Ship-Discharging Plant. Floating Pneumatic Grain-Handling Plant. Engineering, vol. 115, no. 2994, May 18, 1923, pp. 608–610, 34 pp. partly on p. 622 and supp. plate. Describes two floating pneumatic grain discharging plants employed at flour mill at Cardiff for discharging ships which cannot be brought up alongside mills, wheat being transferred to lighters and barges by means of these plants.

H

HEALTH

Eyesight Conservation in Industry. Eyesight Conservation in Industry, Reginald Gordon. Indus. Management (N. Y.), vol. 65, no. 6, June 1923, pp. 345–346. What management is doing to aid workers and increase production.

Industrial Physicians. What Industrial Medicine Means to the Plant Manager, F. W. Dershimer. Indus. Management (N. Y.), vol. 65, no. 6, June 1923, pp. 379–381. Points out need for special training on part of industrial physician, and for better understanding of his functions by management.

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Alphabetical List on page 128

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Herbert Boiler Co.

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Elliott Co.
* Erie City Iron Works
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Springfield Boiler Co.
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Heaters and Purifiers, Feed Water, Metering
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Hoists, Air
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
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* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Hoists, Belt
Clyde Iron Works Sales Co.
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* American Engineering Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
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Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Locomotive & Coach
Whiting Corp'n

Hoists, Mine
Lidgerwood Mfg. Co.
* Nordberg Mfg. Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Hoists, Steam
(See Engines, Hoisting)

Holders, Nipple
Curtis & Curtis Co.

Hose, Acid
United States Rubber Co.

Hose, Air and Gas
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Fire
United States Rubber Co.

Hose, Gas
United States Rubber Co.

Hose, Gasoline
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Metal, Flexible
* Johns-Manville (Inc.)

Hose, Oil
United States Rubber Co.

Hose, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Steam
United States Rubber Co.

Hose, Suction
United States Rubber Co.

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* Carrier Engineering Corp'n

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* Carrier Engineering Corp'n

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Hygrometers
Taylor Instrument Cos.

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* Smidth, F. L. & Co.

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* Crane Co.
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Indicators, CO
* Uehling Instrument Co.

Indicators, CO_2
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* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.

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* Schutte & Koerting Co.

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Midwest Steel & Supply Co.

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Taylor Instrument Cos.
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Weston Electrical Instrument Co.

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* Bacharach Industrial Instrument Co.
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* General Electric Co.
* Precision Instrument Co.
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* Uehling Instrument Co.
* Westinghouse Electric & Mfg. Co.

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Instruments, Surveying
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Keuffel & Esser Co.

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* Johns-Manville (Inc.)

Insulating Materials (Heat and Cold)
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* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

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* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
United States Rubber Co.
* Wheeler, C. H. Mfg. Co.

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* Pittsburgh Valve, Fdry. & Const. Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.
* Lunkenheimer Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.

Keys, Machine
Smith & Serrell
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Ladles
Northern Engineering Works
Whiting Corp'n

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
* Johns-Manville (Inc.)
* Westinghouse Electric & Mfg. Co.

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Levers, Flexible (Wire)
* Gwilliam Co.

Linings, Brake
* Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Furnace & Burner Corp'n
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
McLeod & Henry Co.
* Quigley Furnace Specialties Co.

Linings, Stack
* Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n

Loaders, Portable
* Gifford-Wood Co.
Link-Belt Co.

Lockers, Metal
Manufacturing Equip. & Engrg. Co.

Locomotives, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Locomotives, Storage Battery
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Machine Tool Feed Control Systems (Oil Pressure)
American Fluid Motors Co.

Machine Work
Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Lammert & Mann Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Purvis Machine Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.
* Simplex Valve & Meter Co.

Mechanical Draft Apparatus
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Mechanical Stokers
(See Stokers)

Metal Treating
* American Metal Treatment Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Precision Instrument Co. (Inc.)
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

HEAT TRANSMISSION

Principles. The Principles of Transference of Heat, Geoffrey J. Greenfield. Chem. & Industry, vol. 42, nos. 16 and 17, Apr. 20 and 27, 1923, pp. 390–392 and 417–419, 2 figs. Consideration of heat transmission by convection, conduction and radiation.

HEATING, HOT-AIR

Heaters. Types of Heaters for Hot-Blast Work, Charles L. Hubbard. Power Plant Eng., vol. 27, nos. 10 and 12, May 15 and June 15, 1923, pp. 521–524 and 626–629, 7 figs. Methods of construction and assembly for heating plants in public buildings and industrial plants. Methods for determining heating surface.

HEATING, STEAM

Central-Station. Central Heating of Manitoba's Parliament Building, Geo. R. Archdeacon. Power House, vol. 16, no. 9, May 5, 1923, pp. 21–23, 3 figs. Daily log kept of water of condensation from statement of total cost of operation is prepared for Minister of Pub. Works each month; novel color scheme adopted in piping throughout system.

University of Wisconsin. The University Heating System, Gustus L. Larson. Wis. Engr., vol. 27, no. 8, May 1923, pp. 137–140 and 154, 5 figs. Plant contains nine 350-hp. Babcock & Wilcox water-tube boilers; steam is generated and distributed at 150-lb. pressure; operating records.

HELICOPTERS

Future of. Air Travel with Special Reference to the Helicopter, F. M. Green. Aerial Age, vol. 16, no. 6, June 1923, pp. 268–270. Comparison of helicopter with airplane with regard to power used for support and for flight, safe landing, stability and structural safety; in author's opinion, it is highly unlikely that helicopter type of machine will ever afford useful means of getting from place to place. Lecture before Roy. Aeronautical Soc. of G. B.

HOUSING

Workingmen's Houses. Low-Cost Workingmen's Houses, O. P. Hipple. Management Eng., vol. 4, no. 6, June 1923, pp. 395–398, 4 figs. Possibilities of standardized construction.

HYDRAULIC TURBINES

Governors. Turbines and Governors of the Ritom Hydroelectric Plant of the Swiss Federal Railway (Turbinen und Regler des Kraftwerkes Ritom der Schweizerischen Bundesbahnen), Victor Gelpke. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 18, May 5, 1923, pp. 436–443, 21 figs. Main closing valves of main and auxiliary lines; use of bell-shaped valves for turbines; turbine installation consisting of 4 turbines with total of 9000 kw. at 333⅓ r.p.m. and 810 m. head.; regulation of needle and deflector; safety devices.

Kaplan. Tests on a Kaplan Turbine (Versuche an der Kaplan-Turbine). Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 18, May 5, 1923, pp. 444–447, 7 figs. Details of design and installation of experimental turbine and testing equipment; results of experiments in tabular form.

Modern Types. Modern Hydraulic Turbines. Indian & Eastern Engr., vol. 51, no. 9, Mar. 1923, pp. 135–137, 7 figs. Recent developments in Pelton-wheel practice; Turgo impulse turbines; Pelton-wheel governors; pumped storage.

HYDROELECTRIC DEVELOPMENTS

California. Hydroelectric Power Systems of California and Their Extensions into Oregon and Nevada, Frederick H. Fowler. U. S. Geol. Survey—Water-Supply Paper, no. 493, 1923, 1276 pp., 123 figs., 314 tables. Information on history, markets, electric systems, finances, and rates of each of operating hydroelectric companies in State and shows in outline general conditions under which they have attained their present stage of development.

Muscle Shoals, Ala. Muscle Shoals as it Stands To-Day, Carroll E. Williams. Mfrs. Rec., vol. 73, no. 18, May 3, 1923, pp. 99–103, 8 figs. Work on Wilson dam; dam and power house expected to be completed in 1925 with favorable conditions; total of 850,000 hp. declared possible from dams 2 and 3.

HYDROELECTRIC PLANTS

California. Building of Largest Hydroelectric Powerhouse in the West. Eng. World, vol. 22, no. 5, May 1923, pp. 305–306, 3 figs. Details of design and equipment of fourth power house on Southern Cal. Edison Co.'s Big Creek-San Joaquin River project, known as Big Creek No. 3, now being onstructed; length 200 ft., width 139 ft., height 110 ft.; initial installation will consist of three 35,000-hp. units, which is one-half of its ultimate development.

Canada. City of Winnipeg Hydro Electric Plant, J. G. Glassco. Universal Engr., vol. 37, no. 5, May 1923, pp. 16–21, 4 figs. Notes on power house, which is divided into three bays, viz., wheel pits, generator room, switch and transformer rooms; the eleven generators now installed, consisting of five 3000-kva. 6600 volts 3-phase 60-cycle 164 r.p.m., three 5000-kva. 6600 volts 3-phase 60-cycle 138½ r.p.m., and three 6500-kva. 6600 volts 3-phase 60-cycle 150 r.p.m.; turbine room; pressure piping, air compressors; electric condensers; transformers; transmission lines; etc.

Italy. New Hydroelectric Plants on the Tanagro and Aventino Rivers (Di alcune particolarita dei nuovi impianti idroelettrici sui fiumi Tanagro ed Aventino), G. Fano. Elettrotecnica, vol. 10, nos. 6, 7 and 8, Feb. 25, Mar. 5 and 15, 1923, pp. 106–111, 126–135 and 153–158, 56 figs. Details of design and equipment of each, including barrage dams, water conduits, pressure piping, etc.

I

ICE MANUFACTURE

Clear Ice. Clear Ice Without Agitation, Van Rensselaer H. Greene. Refrig. World, vol. 58, no. 5, May 1923, pp. 13–14. Possibilities of manufacturing a good uniform product by a new system more economical for plants of over 60 tons capacity than those in vogue today. Paper read before joint meeting of Va. Ice Mfrs. Assn. and East. Ice Mfrs. Assn.

Raw-Water Ice. Advancements in Raw Water Ice, Ralph N. Cole. Ice & Refrigeration, vol. 64, no. 5, May 1923, pp. 384–387. Notes on water softening, air agitation system, air dehydrators, use of can baskets, advantages of basket system, dip-tank agitation, can-filling tanks, brine agitation, electric drive, water heaters, ice storage, etc.

ICE PLANTS

Operation. Economical Operation of Ice Plants, Halbert P. Hill. Refrig. World, vol. 58, no. 5, May 1923, pp. 16–18. Points out cost of inefficiency and makes suggestions for effecting savings by correcting defects in operation of plants. Paper read before Joint meeting of Va. Ice Mfrs. Assn. and East. Ice Mfrs. Assn.

IMPACT TESTING

Repeated. Further Report on Repeated Impact Tests, Tsuruzô Matsumura. Kyoto Imperial University, College of Eng.—Memoirs, vol. 3, no. 2, Mar. 1923, pp. 47–60, 27 figs. Results of investigation of depth of notch and blow number; blow number and Upton-Lewis' toughness number; impact energy and blow number.

INDICATORS

Electrical. R. A. E. Electrical Indicator for High-Speed Internal-Combustion Engines, and Gauge for Maximum Pressures, Harry Wood. Instn. Mech. Engrs.—Proc., no. 2, Jan. 1923, pp. 137–146, 5 figs. Royal Aircraft Establishment electrical indicator is of "balanced" type.

Internal-Combustion-Engine. Engine-Testing Instruments, J. Okill. Automobile Engr., vol. 13, no. 176, May 1923, pp. 150–153, 20 figs. Notes on optical indicators, including Hospitalier-Carpentier, Schultz, Burstall's, and Midgley types, and the pressure indicator designed by author.

Micro. Micro-Indicator for High-Speed Engines, W. G. Collins. Instn. Mech. Engrs.—Proc., no. 2, Jan. 1923, pp. 127–135, 12 figs. Instrument is of cylinder and piston type, principal novel feature of which is production of small-scale diagrams on transparent celluloid.

Optical. A New Form of Optical Indicator, F. W. Burstall. Instn. Mech. Engrs.—Proc., no. 2, Jan. 1923, pp. 111–125, 17 figs. Primarily developed for purpose of research work connected with medium-speed high-compression gas engine, and to serve in laboratory where internal-combustion engine experimenting is carried out.

Precision High-Speed. Precision High-Speed and Weak-Spring Indicator (Präzisions-Schnellaüfer- und Schwachfeder-Indikator). Schiffbau, vol. 24, no. 33–34, May 16–23, 1923, pp. 533–535, 9 figs. Describes patented indicator designed by J. Geiger, and gives diagrams of two- and four-stroke oil engines obtained therewith.

Problems. The Problems of the Engine Indicator, Loughnan Pendred. Instn. Mech. Engrs.—Proc., no. 2, Jan. 1923, pp. 95–110. Discusses nature of problems, including inertia, spring vibration, drum and its mechanism, springs and pistons; optical indicators.

INDUSTRIAL MANAGEMENT

Changes in Design. Carrying Out Changes in Design, Clive B. Kearney. Indus. Management (Lond.), vol. 9, nos. 10 and 11, May 17 and 23, 1922, pp. 295–296 and 329–330, 1 fig. Author attempts to analyze expenses most generally incurred, and to suggest ways of simplifying and standardizing semi-clerical work involved in carrying out changes.

Charts. See CHARTS.

Control Board in Locomotive Shop. Control Board in an English Locomotive Shop, I. Wm. Chubb. Am. Mach., vol. 58, no. 26, June 28, 1923, pp. 941–942, 2 figs. Celluloid disks of different colors denote parts delivered to various shops; date wheel determines when certain parts are due in particular departments.

Cost Accounting. See COST ACCOUNTING.

Executives. See EXECUTIVES.

General Manager. What Makes the General Manager Successful? E. H. Fish. Management Eng., vol. 4, no. 6, June 1923, pp. 387–388. Duties of general manager.

Power-Cost Reduction. Lower-Cost Factory Power, Geoffrey C. Brown. Management & Administration, vol. 6, no. 1, July 1923, pp. 67–72, 7 figs. Tells how $9100 per year was saved through planning.

Quantity Production. Accuracy in Quantity Production, Herbert R. Simonds. Abrasive Industry, vol. 4, no. 5, May 1923, pp. 133–146, 10 figs. Accurate gage work is prosecuted on a quantity basis by providing special tools; careful heat treatment eliminates undue warping.

Reorganization. Turning Losses Into Profits, Rudolph Rosenthal and Geoffrey C. Brown. Management Eng., vol. 4, no. 5, May 1923, pp. 307–310, 3 figs. Authors explain how it became necessary for company making high-grade French mirror plates to change its management system from traditional form to plan that established control and made cost analysis possible.

Routing. Routing Cards and Workshop Tags (Laufkarten und Arbeitszettel), Carl Schmitz. Werkstattstechnik, vol. 17, no. 10, May 15, 1923, pp. 302–305, 6 figs. Arrangement of workshop tags of every workpiece in pamphlet form; control of separate working processes by means of follow-up cards.

Time Cards. Methods of Recording Elapsed Time on Jobs, Charles W. Lytle. Management Eng., vol. 4, no. 6, June 1923, pp. 429–435, 18 figs. Presents time cards of various systems.

Time Study. See TIME STUDY.

Workshops. Factory Organization and Management, Kenneth M. Sloan. Eng. Production, vol. 6, no. 129, June 1923, pp. 290–291. Guiding principles of efficiency in workshops.

INDUSTRIAL PLANTS

Repair Shops. Industrial Plant Repair Shop, E. J. Ford. Indus. Engr., vol. 81, no. 3, Mar. 1923, pp. 124–130, 12 figs. Details of methods employed and facilities available for maintenance of electrical equipment in 29 departments, in plant which covers 36 acres of ground.

INDUSTRIAL RELATIONS

Arbitration. Industrial Arbitration, William Mackenzie. Roy. Soc. Arts—Jl., vol. 71, no. 3677, May 11, 1923, pp. 433–445 and (discussion) 445–448. Early legislative efforts; efforts by parties; Conciliation Act; Committee on Production during war period; Industrial Court.

INSULATION, HEAT

Glass Wool. Glass Wool Heat Insulation in Europe, A. D. Sabarsky. Am. Ceramic Soc.—Jl., vol. 6, no. 5, May 1923, pp. 674–684, 11 figs. Review of its development, manufacture and use in Europe. Author believes it to be coming heat insulation of future.

INTERNAL-COMBUSTION ENGINES

Corrosion. Corrosion, W. R. Douglas Shaw. Automobile Engr., vol. 13, no. 176, May 1923, pp. 139–140. Brief notes in relation to internal-combustion engines.

Maintenance. Notes on Maintenance of Four-Cycle Internal Combustion Engines, L. F. P. Sorge. Inst. Mar. Engrs.—Trans., vol. 34, Apr. 1923, pp. 540–552, 7 figs. Discusses troubles which arise in practice, dealing with fuel, exhaust, inlet and starting valves, cylinder cover, piston, air compressors, bearings, etc.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES.]

IRON

Contraction. Influence of Alloy Additions on the Contraction of Iron (Einfluss einiger Fremdkörper auf die Schwindung des Eisens), F. Wüst. Stahl u. Eisen, vol. 43, no. 22, May 31, 1923, pp. 713–720, 6 figs. New contraction-measurement instruments; influence of carbon, silicon, manganese, phosphorus, sulphur, nickel and chromium on contraction.

IRON CASTINGS

Automobile. Quantity Tonnage of Automobile Castings, Henry M. Lane. Iron Age, vol. 111, no. 22, May 31, 1923, pp. 1562–1564, 5 figs. Charging and pouring methods of Wilson Foundry & Machine Co., Pontiac, Mich.; bull ladles used for direct pouring into molds.

Chilled Rolls. Casting Hard Rolls. Engineering, vol. 115, no. 2996, June 1, 1923, pp. 695–696, 8 figs. Account of experimental work carried out by Emil Schüz and described in paper printed in Stahl u. Eisen; explains why molds will crack within first 6 min. after pouring, if they crack at all, and accounts for other peculiarities known to steel foundrymen.

Gray-Iron. Tentative Specification for Grey Iron Castings. Foundry Trade Jl., vol. 27, no. 354, May 31, 1923, p. 449 and (editorial comment) p. 433. Submitted to Instn. Brit. Foundrymen.

L

LABOR

Two and Three Shifts. Labour Shifts in Continuous Industries in the United States, Horace B. Drury. Int. Labour Rev., vol. 7, no. 2–3, Feb.-Mar. 1923, pp. 189–208. Particulars of arrangement of shifts and hours in various industries wholly or partly on continuous processes; methods of effecting change from two to three shifts and results on wages, efficiency, and costs.

Wages and Hours. Wages and Hours of Labor. Monthly Labor Rev., vol. 16, no. 5, May 1923, pp. 117–130. Wages and hours of labor in blast furnaces in 1922; in Australia, 1922; hours of labor on German federal railways; Great Britain; cotton textile industry in Bombay, India.

LABORATORIES

British Admiralty. Admiralty Engineering Laboratory at West Drayton. Engineer, vol. 135, no. 3515, May 11, 1923, pp. 489–490, 6 figs. on supp. plate. Describes work of laboratory and features of its equipment.

General Electric Co., London. The Research Laboratories of the General Electric Company at London (Les laboratoires de recherches de la Général Electric Company Ltd., à Londres), P. Calfas. Génie Civil, vol. 82, no. 21, May 26, 1923, pp. 485–490, 7 figs. Details of plant and equipment for re-

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 128

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Shepard Elect. Crane & Hoist Co.
* Westinghouse Electric & Mfg. Co.

Motors, Synchronous
* Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Lunkenheimer Co.

Oil and Grease Guns
* Royersford Fdry. & Mach. Co.

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Improved Equipment Co.
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Oil Well Machinery
* Brownell Co.
* Ingersoll-Rand Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Oiling Devices
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Lunkenheimer Co.

Oiling Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oils, Fuel
Texas Co.

Oils, Lubricating
Texas Co.
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.
Link-Belt Co.

Ovens, Core
Whiting Corporation

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
Linde Air Products Co.

Packing, Ammonia
France Packing Co.
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Packing, Asbestos
* Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Packing Rubber
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
United States Rubber Co.

Packing Sheet
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Paints, Concrete (For Industrial Purposes)
Smooth-On Mfg. Co.

Paint, Metal
* General Electric Co.
* Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paper, Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
DuPont Engineering Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
Dixon, Joseph Crucible Co.
Keuffel & Esser Co.

Penstocks
Smith, S. Morgan Co.

Petroleum Products
Texas Co.

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* U. S. Cast Iron Pipe & Fdry. Co.

Pipe, Riveted
* American Spiral Pipe Wks.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe, Welded
* American Spiral Pipe Wks.
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Plate Metal Work
(See Steel Plate Construction)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Hyatt Roller Bearing Co.
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Link-Belt Co.
* Medart Co.
* Morse Chain Co.
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* Royersford Fdry. & Mach. Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
Philadelphia Drying Machy. Co.

Presses, Foot
* Royersford Fdry. & Mach. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Machy. Co.

Presses, Punching and Trimming
Long & Allstatter Co.
* Royersford Fdry. & Mach. Co.

Presses, Wax
* Vogt, Henry Machine Co

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machy. Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Machine Co.
Link-Belt Co.
* Medart Co
* Wood's, T. B. & Sons Co.

Pulleys, Iron
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
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Kenworthy, Chas. F. (Inc.

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Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc. Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
Taber Pump Co.
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Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
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* Allis-Chalmers Mfg. Co.
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* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
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* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
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Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
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Midwest Engine Corp'n
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search covering tungsten filaments, chemistry, glass, refractories, primary batteries, electric lamps, metallurgy, photometry, microscopy, electron tubes, etc.

LATHES

Hollow-Spindle. 8½-In. Hollow Spindle Cap Lathe. Engineering, vol. 115, no. 2996, June 1, 1923, pp. 678–679, 12 figs. Describes new pattern of lathe arranged for screw cutting, sliding and surfacing work.

Machining Spherical Surfaces. Machining Spherical Surfaces, F. Osgood Hickling. Machy. (Lond.), vol. 22, no. 554, May 10, 1923, pp. 168–170, 8 figs. Operations on automatic turret and capstan lathes.

LOCOMOTIVE BOILERS

Design. Boiler Design in Relation to Maintenance, A. E. Kyffin. Boiler Maker, vol. 23, nos. 4 and 5, Apr. and May 1923, pp. 100–103 and 132–134, 16 figs. Apr.: Factors entering design and construction of British locomotives and their influence on upkeep and repair problems. Paper read before Instn. Locomotive Engrs. May: Practices employed in British shops in building and repairing locomotive boilers to give maximum service.

Staybolts. New Staybolt Designed to Promote Flexibility. Boiler Maker, vol. 23, no. 5, May 1923, pp. 129–131 and 149, 10 figs. Details of double articulated staybolt developed by A. F. Pitkin for use in locomotive boilers.

LOCOMOTIVES

Belgian. New Locomotives of the Belgian State Railways (Nouvelles locomotives des Chemins de fer de l'Etat belge), F. Cuypers. Association des Ingenieurs sortis de l'École Polytechnique de Bruxelles —Bul. Technique, vol. 18, no. 4, 1922, pp. 258–272, 5 figs. Design and data of new locomotives for freight service, drawing 1039 tons at 45 km.p.h.

Boosters. Tender Booster Increases Tonnage 31 Per Cent. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1433–1436, 7 figs. Delaware & Hudson demonstrate hauling capacity of consolidation locomotive equipped with this device.

Electric. See ELECTRIC LOCOMOTIVES.

Lentz Hydraulic Transmission. Diesel Locomotives with Lentz Hydraulic Transmission (Dieselokomotive mit Lentz'schem Flussigkeitsgetriebe), H. Wittfeld. Glasers Annalen, vol. 92, no. 9, May 1, 1923, pp. 125–126, 2 figs. Describes recent improvements made in Lentz hydraulic transmission.

Long Runs. The Extension of Locomotive Runs. C. B. Peck. Ry. Age, vol. 74, no. 25, May 26, 1923, pp. 1282–1285. Author suggests limitations of locomotive runs; extent to which wide variations in operating conditions are likely to affect results; relation of long runs to development of locomotive; service and maintenance facilities with which it must coördinate.

Lubrication. Locomotive Lubrication, W. E. Symons. Ry. & Locomotive Eng., vol. 36, no. 5, May 1923, pp. 139–141. Review of early practice and comments on hydrostatic vs. force feed of power lubricators.

Mountain and Mikado Types. Mountain and Mikado Types for the Frisco. Ry. Mech. Engr., vol. 97, no. 6, June 1923, pp. 357–359, 5 figs. New oil-burning locomotives based on U. S. R. A. designs modified to suit railroads' standards.

Pacific Type. New Pacific Type Locomotives for the Louisville & Nashville R. R. Ry. & Locomotive Eng., vol. 36, no. 6, June 1923, p. 191, 1 fig. New 4-6-2 type built by Baldwin Locomotive Works; tractive force, 40,700 lb.

Prince of Wales Class. Locomotive Tests Between Crewe and Carlisle, London Midland & Scottish Ry. Ry. Gaz., vol. 38, no. 20, May 18, 1923, pp. 752–754, 3 figs. partly on supp. plate. Engine no. 964 of Prince of Wales class, equipped with modified form of Walschaerts valve gear, recently subjected to severe tests with entirely satisfactory results.

Standardization of Repair Parts. Standardization of Locomotive Repair Parts, M. H. Williams. Ry. Mech. Engr., vol. 97, no. 6, June 1923, pp. 341–347, 10 figs. With particular emphasis on methods of standardizing and machining valve motion pins and bushings.

Superheater. Double-Expansion Superheater Locomotive With Four Coupled Axles and Four Cylinders, Two Interior and Two Exterior—Group 746 (Locomotive a 4 assi accoppiati e asse portante anteriore, e posteriore a vapora surriscaldato e a doppie espansione, a 4 cilindri, 2 interni e 2 esterni —gruppo 746), Industria, vol. 37, no. 6, Mar. 31, 1923, p. 107, 1 fig. New Italian locomotive type 2-8-2.

Thermic Siphons. Locomotive Service Tests on the N. C. & St. L. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1425–1426, 1 fig. Engine with Nicholson thermic siphons runs against one of similar design not so equipped.

Valve Gear. The Lentz Valve Gear for Locomotives (Die Lentz'sche Ventilsteuerung für Lokomotiven), H. Wittfeld. Glasers Annalen, vol. 92, no. 10, May 15, 1923, pp. 134–139, 8 figs. Discusses features and advantages of Lentz valve gear and results of tests carried out on locomotives near Vienna.

LUBRICATING OILS

Blending. Formulas for Blending Oils, Forrest A. Huff. Oil News, vol. 11, no. 9, May 5, 1923, pp. 17–18. Formulas for making automobile oils and specialties; practical directions for good compounding Eastern and Western stocks.

LUMBER

Kiln Drying. Kiln Drying Handbook, Rolf Thelen. U. S. Dept. Agriculture—Dept. Bul., no. 1136, May 12, 1923, 64 pp., 24 figs. Fundamental facts about drying of wood; deals with kiln drying of lumber and other forms of wood.

M

MACHINE SHOPS

British. Harland and Wolff's Diesel Engine Works. Engineering, vol. 115, no. 2997, June 8, 1923, pp. 702–703, 6 figs. on supp. plate. Works consist of three separate buildings; in first are general fitting, erecting and testing shops; second contains heavier plant for engine machine work; and third is devoted to casting stores, brass foundry, copper shop, sheet-iron department, toolrooms and manufacture of crankshafts and thrust and tunnel blocks.

Vienna, Austria. Vulkan Machine Tool Works of Vienna, Godfrey L. Carden. Iron Age, vol. 111, no. 23, June 7, 1923, pp. 1630–1633, 4 figs. Special machines for planing plate edges; turning rolls; planing rails and stamping out coins; general machine-tool situation in Austria.

MACHINE TOOLS

Change Gears. Designing Change-gears for Fixed Centers, H. H. Manning. Machy. (N. Y.), vol. 29, no. 10, June 1923, pp. 799–802. Presents tables and formulas dealing with design of gear sets mounted on shafts or studs having fixed center distances.

Efficiency. Machine Efficiency, G. E. Bailey. Machy. (Lond.), vol. 22, nos. 549 and 550, Apr. 5 and 12, 1923, pp. 27–30 and 57–62, 4 figs. Apr. 5: Studies in cutting-time percentages. Deals with drilling and milling machines. Apr. 12: Planing machines; vertical and horizontal boring machines.

Work-Holding Surfaces. Work-holding Surfaces of Machine Tools, Fred Horner. Machy. (N. Y.), vol. 29, nos. 8, 9 and 10, Apr., May and June, 1923, pp. 594–597, 679–682 and 763–768, 36 figs. Table design for different types of machines.

MACHINERY

Sound Detection in. The Detection, Location and Comparison of Sound, C. E. Noel-Storr. Eng. Production, vol. 6, no. 129, June 1923, pp. 301–302, 2 figs. Describes the Sonometer, a sounder of dual type, developed by Capac Company.

MALLEABLE IRON

High Temperatures, Effect of. Tests Showing the Effect of High Temperatures in Malleable Iron, T. D. Lynch and W. J. Merten. Am. Soc. Steel Treating—Trans., vol. 3, no. 8, May 1923, pp. 833–840, 13 figs. Results of numerous tests made upon malleable-iron castings after being subjected to various high temperatures; susceptibility of structural changes of malleable iron when subjected to various elevated temperatures is shown; tests indicate wide variation in critical temperatures of different samples; authors recommend use of high annealing temperatures from 900 to 925 deg. cent. for malleablizing when it is desired to obtain high quality of material.

MATTER

Electrons, Atoms and Ether. Electrons, Atoms and the Ether, W. B. Cartmel. Eng. Jl. (Eng. Inst. Can.), vol. 6, nos. 4, 5 and 6, Apr., May and June, 1923, pp. 177–179, 245–247 and 281–284, 18 figs. Outline of present knowledge of subject resulting from recent investigations.

METALS

Hardening. Hardness and Hardening, Walter Rosenhain. Chem. & Met. Eng., vol. 28, no. 20, May 21, 1923, pp. 899–901, 5 figs. Hardness of material is defined as power of resisting local displacement of portions of its substance; how hardening can be effected. (Abstract.)

Lattice Strain Theory of Hardening of Metals, Skezug Kimura. Electrotechnical Laboratory—Researches, no. 123, Mar. 1923, 7 pp., 2 figs. According to author's theory, amorphism is considered to be only resulting feature following lattice strain, and interatomic stress caused by this lattice distortion is considered as very origin of hardening; origin of hardness may be attributed to increase of network of boundaries hardened by distortion of lattice.

Internal Strain. The Underlying Principles of the Processes of Internal Strain (Die Grundlagen der Verfestigungsvorgänge), J. Czochralski. Zeit. für Metallkunde, vol. 15, no. 1, Jan. 1923, pp. 7–16, 15 figs. Based on results of cold stretching tests on copper and aluminum crystals, conclusions are drawn with regard to processes of internal strain in metallic materials; nature of strain; relation between processes of flow and strain and internal friction.

Shrinkage. The Shrinkage of Metals, F. Johnson. Foundry Trade Jl., vol. 27, no. 352, May 17, 1923, pp. 393–396, 2 figs. Consequences of shrinkage; theory of angular weakness explained; effect of various factors on total shrinkage; pouring temperature and shrinkage; use of equilibrium diagram; shrinkage apparatus.

Strain and Fracture. Strain and Fracture in Metals. Chem. & Met. Eng., vol. 28, no. 23, June 11, 1923, pp. 1026–1030, 9 figs. Notes on Dr. Rosenhain's recent lecture tour. Why slip, once started, stops; method for distinguishing shock fractures; cure for season cracking; how to increase endurance of metal to alternating stress.

MOLDING MACHINE

Hand-Operated Jolt Ram. Hand-Operated Jolt Ram Moulding Machine. Machy. (Lond.), vol. 22, no. 555, May 17, 1923, p. 201, 2 figs. Important advantage of described system is that machine is entirely self-contained.

Types. The Present Status of Molding-Machine Construction (Der heutige Stand des Formmaschinenbaues), U. Lohse. Zeit. des Vereines deutscher Ingenieure, vol. 67, nos. 12 and 19, Mar. 24 and May 12, 1923, pp. 273–277 and 456–460, 19 figs. Describes various modern types. Mar. 24: Power molding machines. May 12: Turnover-type machines; machines with movable compression cylinder; jarring machines. Concluded from vol. 65, no. 48, Nov. 26, 1922, pp. 1229–1233.

MOLDING METHODS

Brass Cylinders. Mold Hollow Brass Cylinders, Charles Vickers. Foundry, vol. 51, no. 12, June 15, 1923, pp. 491–494, 3 figs. Methods of producing different types; small bronze plungers made in three-part flasks; horizontal and vertical molding and gating methods.

Propeller Wheels. Propeller Molding Is Varied, R. H. Palmer. Foundry, vol. 51, no. 12, June 15, 1923, pp. 482–485 and 490, 18 figs. Methods adopted in molding four standard wheels, while similar in general principle, differ considerably in many details essential to making of molds.

MOLDS

Long-Life. New Long-Life Mould Development, Richard Moldenke. Metal Industry (Lond.), vol. 22, no. 21, May 25, 1923, pp. 529–531, 3 figs. Describes mold which is said to be capable of producing 400 castings per hour, and its application in casting carburetors and pistons. Paper read before Am. Foundrymen's Assn.

MOTOR BUSES

Engines. Six-Cylinder Bus Engine Developed by Herschell-Spillman. Automotive Industries, vol. 48, no. 21, May 24, 1923, pp. 1129–1131, 2 figs. New 452-cu. in. product has seven-bearing crankshaft; other features include full-pressure lubrication controlled by inter-connection with throttle, camshaft shifter for relief of compression and overhead valves with barrel-type guides.

Gasoline-Electric. A Petrol-Electric Development. Motor Transport, London, vol. 36, no. 950, May 14, 1923, pp. 595–596, 4 figs. Describes vehicle for passenger service manufactured by Tilling-Stevens Motors, Ltd., England, known as T.S. 6; driver-beside-engine type chassis; Ricardo engine.

London "N. S." Type. London General Omnibus Company Developments. Ry. Gaz., vol. 38, no. 20, May 18, 1923, p. 754, 2 figs. New type of bus placed in service; in preparing design, company had in view provision of covered-in upper deck.

MOTOR TRUCKS

Charcoal Producer Gas for. Charcoal Producer Gas, J. E. Kirchner. Automobile Engr., vol. 13, no. 176, May 1923, p. 138, 3 figs. Describes economical system of Hungarian origin; producer is double-walled cylindrical vessel lined with firebrick and charged from hopper arranged over central opening; its economical use for motor trucks.

Combined Tractor and Trailer. A Coupling for Road Wagons. Engineer, vol. 135, no. 3515, May 11, 1923, pp. 505–506, 5 figs. Describes vehicle which consists of tractor or locomotive part and trailer; two parts may each be used quite independently, but may be also joined together by one man, in course of 1 or 2 minutes, to form six-wheeled vehicle; coupling used for joining body to tractor takes form of ball and socket, and is mounted on rear of tractor.

Electric. Autocar Adds an Electric Truck to Present Line. Automotive Industries, vol. 48, no. 23, June 7, 1923, pp. 1235–1236, 2 figs. Similar to gasoline type in design and construction; motor and controller located under seat and readily accessible; drives through two-piece propeller shaft; weighs without battery about 4000 lb.

Construction of Electric Trucks (La construction des camions électriques en France), A. Canac. Revue Générale de l'Electricité, vol. 13, no. 15, Apr. 14, 1923, pp. 607–613, 5 figs. Electric automobile developments; advantages of electric traction; trucks of French construction; development of traction by storage battery.

Freighter. A Remarkable Two-tonner. Motor Transport, London, vol. 36, no. 951, May 21, 1923, pp. 613–615, 5 figs. Describes the S. D. freighter, a new-type gasoline-driven road vehicle manufactured by Shelvoke & Drewry, Ltd., England, specially designed to meet certain phases of town transport; 4-cylindered engine.

Six-Wheeled. Renault Six-wheelers. Motor Transport (Lond.), vol. 36, no. 949, May 7, 1923, pp. 561–563, 6 figs. Details of 5-ton and 10-ton flexible combination vehicles with detachable semi-trailers; 4-cylinder monobloc engines; 5-tonner, 15.9 hp., and 10-tonner 22.4 hp.

Steam. The Steam Wagon from the Designer's Point of View, F. J. Bretherton. Automobile Engr., vol. 13, no. 176, May 1923, pp. 156–159, 9 figs. Deals with boilers, engines, undertype engines, steering gear, transmission, rear axles, frames and fuel supply.

N

NON-FERROUS METALS

Corrosion. Corrosion of Non-Ferrous Metals (Betrachtungen über Korrosion von Nichteisenmetallen) W. Fraenkel. Zeit. für angewandte Chemie, vol. 36, no. 37–38, May 9, 1923, pp. 245–247. Corrosion of condenser tubes; electrochemical action; role of oxygen; protection against corrosion; etc.

NOZZLES

Diffusers for Air Currents. Tests with Diffusers [Ueber Versuche mit Verdichtungsdüsen (Diffu-

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* Johns-Manville (Inc.)

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope Drives
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rubber Goods, Mechanical
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
United States Rubber Co.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Water Intake (Traveling)
Chain Belt Co.
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Drive (Hardened)
* Parker-Kalon Corp'n

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker-Kalon Corp'n

Screws, Set
Allen Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Machy. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Co.

Shafting, Flexible
* Gwilliam Co.

Shafting, Turned and Polished
Cumberland Steel Co.
Link-Belt Co.

Shapes, Brick
McLeod & Henry Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Shears, Alligator
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Shears, Plate
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Sheaves, Rope
Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Nordberg Mfg. Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Sheets, Rubber, Hard
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Shelving, Metal
Manufacturing Equip. & Engrg. Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp Wm. & Sons Ships & Engine Bldg. Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

soren)], August Riffart. Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, no. 257, 1922, 42 pp., 70 figs., 8 tables on supp. plates. Theory of diffuser; account and results of test to investigate phenomena of flow in various types and causes for great losses. Deals only with diffusers for air currents.

O

OIL ENGINES

De La Vergne. Steps in De La Vergne Oil Engine Development. Power Plant Eng., vol. 27, no. 12, June 15, 1923, pp. 630–632, 4 figs. Features of early engines which have influenced design of present solid or pump-injection type.

Types of Modern Power Plant Oil-Engines. Oil Engine Power, vol. 1, no. 5, May 1923, pp. 233–239, 9 figs. New De La Vergne vertical 4-cycle model which is eventual outgrowth from original Akroyd engine which antedated Diesel type.

Falk. Types of Modern Power-Plant Oil-Engines. Oil Engine Power, vol. 1, no. 6, June 1923, pp. 288–292 and 297–298, 10 figs. New Falk trunk-piston, 4-cycle, airless-injection unit.

German Construction. German Oil-Engine Construction To-day. Julius Kuttner. Oil Engine Power, vol. 1, no. 5, May 1923, pp. 246–247, 1 fig. Impressions of 2-years' study of present-day methods.

Hot-Bulb. Hot-Bulb Oil Engines with Cold-Starting Device. Engineering, vol. 115, no. 2996, June 1, 1923, p. 694, 4 figs. Details of 36-hp. twin-cylinder 2-stroke, hot-bulb oil engine which will run satisfactorily on crude or refined petroleum.

Lubrication. Automatic Lubrication of Oil Engines and the McCord System. Oil Engine Power, vol. 1, no. 4, Apr. 1923, p. 193, 1 fig. Data on internal and external lubrication, and on force-feed lubricator developed by McCord Radiator & Mfg. Co.

Marine. Oil Engines Designed for Large Liners. Mar. Eng., vol. 28, no. 6, June 1923, pp. 363–364, 1 fig. 7000-b.hp. double-acting engine built by Burmeister & Wain for Swedish-American liner; and Sulzer 3000-b.hp. single-acting Diesel engine for German liner Fulda.

The Falk Corporation, Milwaukee, Wis. Motorship (Special Falk Supp.), 1923, 60 pp., 69 figs. Description of plant; Falk marine reduction gears; Falk heavy-oil engin., with details of design; weight and dimensions of 2260-b.hp. unit; test results.

Solid-Injection. The Development of the Hesselman Solid-Injection Oil Engine. Edvin Lundgren Power, vol. 57, no. 24, June 12, 1923, pp. 927–929, 6 figs. In new engine, comparatively low compression is used and dual combustion takes place; engine compression must be high enough to insure ignition; fuel-valve design and advantages.

OIL FUELS

Self-Ignition Temperatures. The Self-Ignition Temperatures of Fuels. H. T. Tizard. Automobile Engr., vol. 13, no. 176, May 1923, pp. 136–137. Summarization of results of experiments described in previous paper, and description of further experiments elucidating points of special interest.

OPEN HEARTH FURNACES

Coke-Oven-Gas Heating. Working Process in Open-Hearth Plant of the Hoesch Iron and Steel Works, with Special Consideration of the Hoesch Process and the Heating of Furnaces with Coke-Oven Gas (Ueber die Arbeitsweise im Martinwerk des Eisen- und Stahlwerks Hoesch unter besonderer Berücksichtigung des Hoeschverfahrens und der Beheizung der Oefen mit Koksofengas). Otto Schweitzer. Stahl u. Eisen, vol. 43, no. 20, May 17, 1923, pp. 649–657 and (discussion) 657–659, 4 figs. Practical results with Hoesch process; advantages of heating with coke-oven gas.

Malleable Castings. New Furnace for Malleable Castings. Alfred Gradenwitz. Iron Age, vol. 111, no. 25, June 21, 1923, pp. 1781–1782, 4 figs. Small open-hearth furnace developed in Switzerland to make thin-walled and complicated castings; unusually high temperature used.

Reversing Valves. Regenerative Reversing Valve. Iron Age, vol. 111, no. 23, June 7, 1923, pp. 1628–1629, 4 figs. Six-way self-contained unit performs whole operation in 10 sec.; avoids gas leak during reversal. See also Iron Trade Rev., vol. 72, no. 23, June 7, 1923, pp. 1669–1671, 5 figs.

ORDNANCE

Shrink Fits. Shrink Fits at Watertown Arsenal. F. Brauer. Am. Mach., vol. 58, no. 23, June 7, 1923, pp. 845–846, 4 figs. Data as to practice of Ordnance Dept. of U. S. Army in shrink fits for both bronze and steel.

OXY-ACETYLENE WELDING

Ammonia Pipe Lines. Oxy-Acetylene Welding of Ammonia Pipe Lines, Coils and Pressure Vessels. C. Wilkie. Refrig. Eng., vol. 9, no. 11, May 1923, pp. 325–331 and (discussion) 331–332 and 334, 10 figs. Advantages of welded pipe lines and coils; fusion welding of steel pipe; welding metal for fusion welding; preparing pipe for welding; quality and efficiency of welded pipe joints; relieving welding strains in pipe lines; requirements of first-class pipe welder.

Locomotive Frame. Locomotive Frame Welding. A. F. Dillon. Welding Engr., vol. 8, no. 5, May 1923, pp. 19–20 and 32, 6 figs. Locomotive frame welding by oxy-acetylene process; welder must have room to handle torch comfortably; welders work in shifts.

Progress. Progress in Oxy-Acetylene Metal Work (Fortschritte in der autogenen Metallbearbeitung). C. Ad. Dittmann. Werkstattstechnik, vol. 17, no. 9, May 1, 1923, pp. 266–267, 6 figs. Describes apparatus for cutting of rivet heads, and for welding of copper tubes and sheets; armored cutting burners; safety against strike-back of flame.

Storage Tanks. Fabricating Storage Tanks by Oxy-Acetylene Welding. Acetylene Jl., vol. 24, no. 12, June 1923, pp. 583–586, 7 figs. How one producer of gasoline storage tanks has speeded up output and increased economy in his plant; construction methods for underground, rectangular, and large storage tanks; layout of welding shop; methods of testing.

P

PAINTS

Mineral Spirits for Thinning. United States Government Specification for Volatile Mineral Spirits for Thinning Paints. U. S. Bur. of Standards—Circular, no. 98, Feb. 28, 1923, 10 pp., 2 figs. Specification officially adopted by Fed. Specifications Board for use of departments and independent establishments of Government in purchasing.

White Pigments. Brightness, Whiteness and Hiding Power of Opaque White Pigments. Paints and Enamels. H. A. Gardner and P. C. Holdt. Paint Mfrs. Assn. of U. S., Sci. Section—Circular no. 17, Apr. 1923, pp. 153–182, 12 figs. Experimental results.

PANS

Steam-Jacketed. British Standard Specification for Cast Iron and Enamelled Cast Iron Steam-Jacketed Pans. Brit. Eng. Standards Assn., no. 186, Mar. 1923, 15 pp., 4 figs. Specifications for dimensions, enameling, castings, screw threads, working pressures, hydraulic test, steam test.

PISTON RINGS

Manufacture. The Manufacture of Piston Rings. Machy. (Lond.), vol. 22, no. 557, May 31, 1923, pp. 261–268, 14 figs. Methods employed by British Piston Ring Co., Coventry, in manufacture of piston rings from centrifugal castings.

PISTONS

Temperature Variations. Temperature Variations and Heat Absorption of Internal-Combustion Engine Pistons. Max Jakob. Mar. Engr. & Nav. Architect, vol. 46, no. 548, May 1923, pp. 173–175, 1 fig. Discussion of problems. Translated from Zeit. des Vereines deutscher Ingenieure, Dec. 23, 1922. Bibliography.

PLANERS

Side. A Modern Side Planing Machine. Brit. Machine Tool Eng., vol. 2, no. 21, May-June 1923, pp. 628–631, 9 figs. Points out advantages of this type of machine and variety of work it can deal with.

POWER PLANTS

Solar. The Berland-Caufourier Solar Power Plant. P. Caufourier. Mech. Eng., vol. 45, no. 6, June 1923, pp. 364–365, 2 figs. Describes combination of Caufourier self-vaporizer for generation of steam from water at temperatures of 50 to 75 deg. cent. and Berland system of mirrors; project for application of this type of power plant has been worked out at Touggourt oasis, which calls for solar power plant with mirror area of 2400 sq. m., and power output per year of 300,000 kw-hr. Translated from Génie Civil, vol. 82, no. 14, Apr. 7, 1923, p. 327.

POWER TRANSMISSION

Apparatus, Safety Code for. Safety Code for Mechanical Power-Transmission Apparatus. Mech. Eng., vol. 45, no. 6, June 1923, pp. 384–385. Code now proposed for general adoption by industrial accident boards and commissions of various states.

PRESSWORK

Methods. Pressed-Steel Plant. Practice of a Pressed Steel Plant. Fred R. Daniels. Machy. (N. Y.), vol. 29, no. 10, June 1923, pp. 790–793, 10 figs. Methods employed by New England Pressed Steel Co. Sheet-metal drawing performed by dies of unusual design.

PRINTING PRESSES

Manufacture. Manufacturing the Miehle Printing Press. Howard Campbell. Am. Mach., vol. 58, nos. 21 and 23, May 24 and June 7, 1923, pp. 751–754 and 827–829, 25 figs. Special machines and their operation; inspection methods and tools. Straightening heavy shafts; broaching jobs; forming "shoo-fly" finger; slotting pins in lathe.

PRODUCER GAS

Pulverized-Coal. Producer Gas from Powdered Coal. R. T. Haslam and Louis Harris. Indus. & Eng. Chem., vol. 15, no. 4, Apr. 1923, pp. 355–357, 1 fig. Report of experiments carried out to find reason for lack of development of process, and, if possible, to devise means for overcoming difficulties.

PROFILING

Methods. Effecting Profiling Methods. J. Booth. Machy. (Lond.), vol. 22, no. 558, June 7, 1923, pp. 299–300, 5 figs. Describes tools designed to produce pieces with correct outline of profile and accurate relation of profile to other characteristics.

PULLEYS

Broken, Repair of. How to Repair and Balance a Broken Belt Pulley. Gustav H. Radebaugh. Coal Age, vol. 23, no. 24, June 14, 1923, pp. 969–972, 20 figs. Method of balancing pulley; preventing belt from slipping; covering pulley for greater adhesion.

PULVERIZED COAL

Advantages and Tests. Advantages to be Gained from Pulverizing Canadian Fuels. H. D. Savage. Eng. Jl., vol. 6, no. 6, June 1923, pp. 271–280, 5 figs. Review of practical results in existing installations and operating tests with various powdered fuels.

Firing. Pulverized Coal Firing at Plant of Société Anonyme Ougree-Marihaye, Ougree, Belgium [Installation de chauffage par combustible pulvérisé aux établissements de la Société Anonyme Ougree-Marihaye Ougree (Belgique)]. P. Butez. Chaleur et Industrie, vol. 4, no. 36, Apr. 1923, pp. 327–331, 6 figs. partly on supp. plate. Describes plant constructed on Quigley system, including pulverizers, conveying and distribution, and data of operations.

The "Lopulco" System of Pulverized-Fuel Firing. Iron & Coal Trades Rev., vol. 106, no. 2882, May 25, 1923, p. 790, 1 fig. Describes boiler house being built and equipped with Lopulco system for Société Anonyme Union d'Electricité, Paris: details of system; power consumed by system for preparation of coal, delivering it to burners, including pulverizing, air separating, drying, and conveying, will not exceed 19½ kw-hr. per ton of coal burned. See also description by David Brownlie in Power Engr., vol. 18, no. 207, June 1923, pp. 205–208 and 224.

The Technique of Powdered Fuel Firing. Henri Verdinne. Fuel in Sci. & Practice, vol. 2, no. 5, June 1923, pp. 146–151. Inflammability of dust cloue; degree of pulverization and limiting rate of fall of particles; practical difficulties. Translated from Revue Universelle des Mines, Apr. 1923.

PUMPS

Pneumatic Displacement. A New Pneumatic Displacement Pump. Power Engr., vol. 18, no. 207, June 1923, pp. 231–232, 1 fig. Aeroflux pump suitable for comparatively small units, special feature of which lies in patented valve mechanism.

R

RAILLESS TRACTION

Great Britain. Railless Traction Developments in Great Britain. Indian Industries & Power, vol. 20, no. 6, Feb. 1923, pp. 197–200, 4 figs. Describes principal systems in use in Great Britain.

RAILS

Pressure of Wheels on. Measurement of Pressure of Wheels on Rails on Railway Tracks (Messungen des Druckes zwischen Rad und Schiene am Eisenbahngleis). Saller. Zentralblatt der Bauverwaltung, vol. 43, no. 37–38, May 9, 1923, pp. 220–222, 1 fig. Reviews development of problem; calculations based on oscillation of car springs; optical measurement; measurement of oscillation of spring-suspended cars.

Rerolling. The Rerolling of Old Rails (Das Wiederverwalzen alter Eisenbahnschienen). A. Nöll. Stahl u. Eisen, vol. 43, no. 19, May 10, 1923, pp. 617–624 and (discussion) 624–625, 15 figs. Operation of roll with indirect pressure; calibration for rerolling in inclined position according to Dickmann process; influence of strength factors; economic factors.

RAILWAY CONSTRUCTION

Economics. Notes on the Economics of Railroad Construction, Maintenance and Operation. F. S. Stevens. New York R. R. Club—Official Proc., vol. 33, no. 6, Apr. 20, 1923, pp. 7039–7046. Importance of light grades; slow-speed continuous train movement; terminal problem; steam vs. electric locomotives; track maintenance; super elevation of rail on curves. Author foresees necessity for use of wider gage. See also (discussion) pp. 7046–7061.

RAILWAY ELECTRIFICATION

Mainline Electrification in Italy. F. A. Shepley. Elec. Traction, vol. 19, no. 5, May 1923, pp. 219–223, 5 figs. Notes on electric-power production; form of turbine; steam vs. electrical operation; consumption of energy; locomotives.

Switzerland. The Completion of the Rhaetian Railway Electrification. Engineer, vol. 135, nos. 3514 and 3515, May 4 and 11, 1923, pp. 464–466 and 474, and 492–494, 16 figs. System represents total length of track of about 280 km., and includes gradients to 4.5 in 100; whole line has been electrified, single-phase system with current at 11,000 volts, 16⅔ cycles being adopted. Details of power supply, distribution system overhead equipment, communication and signaling circuits, repair-shop equipment.

Virginian Ry. Virginian to Electrify Heavy Grade Division. Ry. Elec. Engr., vol. 14, no. 5, May 1923, pp. 131–132, 2 figs. Project will include 134 mi. of line and will cost $15,000,000; single-phase system will be used.

RAILWAY MANAGEMENT

Staff Records Maintenance. The Maintenance of Railway Staff Records. Ry. Gaz., vol. 38, no. 19, May 11, 1923, pp. 719–720, 6 figs. Card-index system of maintaining staff records is adopted in western division of Lond., Midland & Scottish Ry.; greater facility of reference, improved accessibility and clearer indication are among advantages claimed, as compared with old book method.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 128

DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
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Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
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* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Poole Engrg. & Mch. Co.

Spray Cooling Systems
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* Spray Engineering Co.

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

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Baldwin Chain & Mfg. Co.
* Fuller-Lehigh Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.

Steel, Cold Rolled
Cumberland Steel Co.
* Union Drawn Steel Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Falk Corporation
* Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
* Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Keeler, E. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

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* Babcock & Wilcox Co
Combustion Engineering Corp'n
Green Engineering Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Overfeed
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Switches, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Synchronous Converters
(See Converters, Synchronous)

Synchroscopes
Weston Electrical Instrument Co.

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Tachometers
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

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* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
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* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

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* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n.
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
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* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

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* Brownell Co.
* Cole, R. D. Mfg. Co.
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Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

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(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Machinery
* Franklin Machine Co.

Thermometers
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Thermometers, Distance
Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.

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* Fulton Co.
* General Electric Co.
* Powers Regulator Co.

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* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

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* Landis Machine Co. (Inc.)

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* Ingersoll-Rand Co.

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Link-Belt Co.

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Kenworthy, Chas. F. (Inc.)

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* Warner & Swasey Co.

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* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
DuPont Engineering Co.

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* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tractors, Industrial (Storage Battery)
Yale & Towne Mfg. Co.

Tractors, Turntable
Whiting Corp'n

Trailers, Industrial
Yale & Towne Mfg. Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
Whiting Corp'n

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Transmissions, Variable Speed
American Fluid Motors Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Treads, Stair (Rubber)
United States Rubber Co.

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n
Whiting Corp'n

Trucks, Industrial (Storage Battery)
Yale & Towne Mfg. Co.

Trucks, Trailer
Yale & Towne Mfg. Co.

Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.

Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Tubing, Rubber (Hard)
* Goodrich, B. F. Rubber Co.

Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mch. Co.
Whiting Corp'n

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith S. Morgan Co.
* Worthington Pump & Mchy. Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Elec. & Mfg. Co.

Turbo-Blowers
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Turbo-Compressors
* Ingersoll-Rand Co.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Electric & Mfg. Co.

Turbo-Pumps
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

Turntables
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

RAILWAY MOTOR CARS

Germany. Railway Motor Cars (Eisenbahntriebwagen). Motorwagen, vol. 26, no. 12, Apr. 30, 1923, pp. 196–198, 3 figs. Most important features of four models built by Deutsche Werke A. G., Werft Kiel.

RAILWAY OPERATION

Train Accidents. Train Accidents in Great Britain, George Hold. Ry. Signal Engr., vol. 16, no. 6, June 1923, pp. 250–252. Analysis made covering 20-year period; better instruction, supervision and discipline suggested as remedies. (Abstract.) Paper presented before Instn. Ry. Signal Engrs. of Great Britain.

Train Loading. Train Loading—A Problem for the Dispatcher, O. O. Carr. Ry. Rev., vol. 72, no. 20, May 19, 1923, pp. 850–852. Methods for enforcing most economical train loading.

RAILWAY REPAIR SHOPS

Locomotive. A Modern Medium-Size Shop at Cheyenne. Ry. Mech. Engr., vol. 97, no. 6, June 1923, pp. 325–333, 14 figs. Union Pacific makes 15 classified locomotive repairs a month in new plant employing 570 men.

Factors in the Location and Layout of Locomotive Repair Shops. H. L. Cole. Ry. Board of India (unofficial publication), Tech. Paper, no. 232, 1922, 71 pp., 13 figs. (See also supp. paper including 24 plates.) Classification of repair shops and repairs; location and types of main repair shops; grouping of shop buildings and of machine tools; engine mileage and frequency of shopping; shop repairs and traffic humps; capacity in relation to pit accommodation and to personnel; trade proportions and man-hours per engine repaired; capacity in relation to machine-tool equipment; production. Shop layout and system at Stratford shops of Grand Trunk Ry.; examples of locomotive repair schedules.

Waco, Tex. Repair Shop Has All Facilities Under One Roof. Ry. Age, vol. 74, no. 28, June 16, 1923, pp. 1419–1422, 5 figs. New "Katy" plant accommodates erecting, machine tools, boiler and tank work and stores in one building.

RAILWAY SHOPS

Car. Steel-Car Construction at the Angus Shops of the Canadian Pacific Railway, Montreal, H. R. Naylor. Mech. Eng., vol. 45, no. 6, June 1923, pp. 349–352, 7 figs. Describes shop completely, giving particulars regarding its layout, crane facilities, machine equipment, etc.; various machining operations and jig method of car assembly, first put into practice at this shop, and methods used in final erection and finishing of cars. (Abridged.)

RAILWAY SIGNALING

Automatic Block. C. & O. Installs New Signaling with Train Control. Ry. Age, vol. 74, no. 27, June 9, 1923, pp. 1357–1360, 10 figs.; also Ry. Signal Engr. vol. 16, no. 6, June 1923, pp. 243–248, 13 figs. Three-indication color-light automatic block signals operated by alternating current, together with ramps and control equipment for automatic train control, installed on 40 mi. of single track between Charlottesville, Va., and Staunton.

I. C. C. Issues Annual Statistics on Signaling. Ry. Signal Engr., vol. 16, no. 6, June 1923, pp. 257–261, 3 figs. Annual report of Bur. of Safety of Interstate Commerce Commission shows increase of 1004 mi. of automatic block during 1922.

Belgium. New System of Signaling on the Belgian State Railways, J. Verdeyen. Int. Ry. Congress—Bul., vol. 5, no. 5, May 1923, pp. 419–441, 21 figs. Introduction of 3-position signal in conjunction with distant signals in system of Belgian railways; practical applications.

Indicator, D. C. Direct Current Relays. Am. Ry. Assn. (Signal Section)—Proc., Mar. 1923, pp. 422–434. Specification for d.c. indicator.

Interlocking. B. R. T. Automatic Interlocking, A. A. Roberts. Ry. Signal Engr., vol. 16, no. 6, June 1923, pp. 253–255, 3 figs. Switch, signals and train stop controlled automatically by train movement, introducing saving of $390 a month.

Light Signals. New Signals Being Installed at the Chicago Union Station, T. Holt. Ry. Age, vol. 74, no. 25, May 26, 1923, pp. 1263–1264, 3 figs. Use of five-position light indications results in maximum visibility.

Single-Track. Economics of Railway Signaling—Committee XIX. Am. Ry. Assn. (Signal Section)—Proc., Mar. 1923, pp. 386–397, 1 fig. Description and discussion of proposed plan for operation of single-track line by signal indication.

RAILWAY TRACK

Gage Widening. Widening the Gauge, F. Lavis. New York R. R. Club—Official Proc., vol. 33, no. 6, Apr. 20, 1923, pp. 7046–7050. Discussion based on suggestion in paper by F. S. Stevens in same journal that it may in future be desirable to widen gage of railroads in order to permit haulage of heavier trains. See also articles entitled, Effect on Locomotive Design, by James Partington, pp. 7050–7052, and Wider Gauge and Train Speeds, W. E. Symons, pp. 7052–7053, bearing on same subject.

RAILWAYS

South America. The New Transandine Railway. Ry. Gaz., vol. 38, no. 22, June 1, 1923, pp. 816–819, 8 figs. Construction of new international railway from Salta, Argentine, to Antofagasta, Chile, via Huaytiquina, a distance of 800 km.

REFRACTORIES

Manufacture, U. S. Manufacture of Refractories in America, A. F. Greaves-Walker. Iron & Coal Trades Rev., vol. 106, no. 2879, May 4, 1923, p. 631. Processes for fireclay, silica, and magnesite and chrome products. (Abstract.) Paper read before Ceramic Soc.

REFRIGERATING MACHINES

Small Automatic. Small Automatic Refrigerating Installations. Refrig. Eng., vol. 9, no. 11, May 1923, pp. 340–342, 4 figs. Describes small automatic machine, known as "Autofrigor," built by Escher, Wyss & Cie., Zurich, its construction, performance and application. Translated from Revue Générale du Froid, Jan.-Feb. 1923.

REFRIGERATING PLANTS

Radiators, Cast-Iron. Cast-Iron Radiators for Refrigerating Coils, H. J. Macintire. Power, vol. 57, no. 23, June 5, 1923, pp. 896–897, 4 figs. Points out advantages of radiator section for refrigeration, rather than piping; pressure tests of section; field results.

Uniflow Steam Engines in. The Uniflow Steam Engine. Ice & Cold Storage, vol. 26, no. 302, May 1923, pp. 112–113. Discusses use of uniflow steam engine as prime mover for refrigerating plants.

RESEARCH

High-Temperature. Laboratory Apparatus for Heating to High Temperatures (Les appareils de laboratoire pour le chauffage aux hautes températures), M. Garvin and Georges Chaudron. Chimie & Industrie, vol. 9, no. 4, Apr. 1923, pp. 647–650, 6 figs. Fusion in vacuum of steel samples for studying refining of impurities; fusibility of very refractory metals.

ROLLING MILLS

Bloom-Charging Machine. Ground Type Bloom-Charging Machine. Iron & Coal Trades Rev., vol. 106, no. 2879, May 4, 1923, p. 633, 3 figs. Duty is to take bloom from press and charge it into reheating furnace, and to deliver reheated pressing to disk mill.

Cold Rolling. On the Influence of the Cold Rolling on the Properties of Sheet Steel, Yasujiro Niwa and Jiro Matûra. Electrotech. Laboratory—Researches, no. 122, Dec. 1922, 20 pp., 45 figs. on supp. plates. Change of inner structure of steel by successive cold rolling is discussed by interference method of X-ray.

Economics. Rolling Mill Economics (Ausbeute und Wirkungsgrad von Walzwerken). Elektrotechnischer Anzeiger, vol. 40, no. 80, May 19, 1923, pp. 559–560. Electric drive; blooming, sheet, and wire mills; cost data of rolling-mill production.

Electrically Driven. Electric Mill Drive Is Efficient, Henry E. Davis. Iron Trade Rev., vol. 72, no. 22, May 31, 1923, pp. 1611–1614. Bar-mill equipment installed in East Chicago plant in 1921 has shown satisfactory and economical operation; slow-speed direct-drive motor a feature; main and auxiliary apparatus. (Abstract.) Paper presented before Am. Iron & Steel Inst.

RUBBER

Soft, Machining. Machining Soft Rubber, E. Lytton-Brooks. Am. Mach., vol. 58, no. 24, June 14, 1923, pp. 865–867, 14 figs. Methods of holding rubber for machining; tools for various operations; precautions necessary to compensate for distortion, cutting lubricant used.

S

SAFETY

Codes. The Development of Industrial Safety Codes, M. G. Lloyd. Mech. Eng., vol. 45, no. 6, June 1923, pp. 356–357. After giving statistics showing need for accident-prevention work from both humanitarian and economic viewpoint, author shows value of state inspections and national codes; presents brief history of Am. Eng. Standards Committee's activity in this field and of Safety Code Correlating Committee; outline of manner in which safety codes are now formulated.

Industrial. Industrial Safety. Int. Labour Rev., vol. 7, no. 2–3, Feb.-Mar. 1923, pp. 402–417. Principles of accident prevention; accident prevention and inspection in Great Britain, Switzerland, Austria and Belgium; German mining accidents, rescue work and accident insurance.

SAND, MOLDING

Permeability. Mathematical and Experimental Contribution to the Study of Foundry Sands (Contribution mathématique et expérimentale à l'étude des sables en fonderie), Georges-Louis Borne. Fonderie Moderne, vol. 17, May 1923, pp. 151–154, 4 figs. Discusses permeability, its definition and method of determination, giving examples of calculation.

SCREW MACHINES

Brass vs. Steel Products. Reducing Screw Machine Product Costs By Substituting Brass for Steel, Harold L. Burlingame. Am. Mach., vol. 58, no. 23, June 7, 1923, pp. 823–824, 1 fig. Savings result from higher operating speeds; reduction in cost of tool equipment; limitations imposed by size of stock; salvage values of materials.

SCREW THREADS

Tolerances, German Standards for. Remarks on German Industrial (NDI) Standards for Screw Thread Tolerances (Erläuterungen zu den Normenblättern der Gewindetoleranzen), G. Berndt. Werkstattstechnik, vol. 17, no. 6, Mar. 15, 1923, pp. 161–175, 7 figs. Deals with tolerances and thread fits; metric and Whitworth threads; control of screws; accuracy of gages. Presents NDI standard tables for metric and Whitworth threads.

SCREWS

Wood. U. S. Government Specification for Wood Screws. U. S. Bur. of Standards—Circular, no. 140, Mar. 26, 1923, 6 pp. Specification officially adopted by Fed. Specification Board for use of departments and independent establishments of Government in purchasing.

SEAPLANES

Martin-Navy. The Martin-Navy All Metal Scout Seaplane. Aerial Age, vol. 16, no. 6, June 1923, p. 263, 1 fig. Believed to be smallest seaplane ever built, being 18 ft. wide, 17½ ft. long and 7½ ft. high from water line; weighs less than 650 lb.

Testing Models of. Ten Years' Testing of Model Seaplanes, G. S. Baker. Roy. Aeronautical Soc.—Jl., vol. 27, no. 149, May 1923, pp. 224–238 and (discussion) 239–243, 6 figs. partly on supp. plate. Account of beginnings of tank tests of seaplane hulls carried out under authority of Advisory Committee for Aeronautics in 1912. Differences between model tests and machine; method of estimating machine data from model tests, and checks upon such estimates obtained by actual measurement on machines. List of published papers giving results of tests carried out in Wm. Froude National tank.

SOLDERING

Processes. The Soldering of Metals, Wm. Mason. Metal Industry (Lond.), vol. 22, no. 19, May 11, 1923, pp. 469–471. Explains processes of soldering various metals and gives constituents of fluxes in general use in tabular form.

SOLDERS

Aluminum. Solders for Aluminum. U. S. Bur. of Standards—Circular, no. 78, Mar. 20, 1923, 14 pp., 7 figs. Results of recent tests of several new solders, Bibliography.

SOOT BLOWERS

Mechanical. Improvements in Mechanical Soot Blowers by the Bayer Company, W. F. Schaphorst. Steam, vol. 31, no. 4, Apr. 1923, pp. 105–108, 7 figs. Revolving soot-blower element developed by Bayer Co. that overcomes temperature difficulties by use of monel metal, and possesses other valuable features.

SPARK PLUGS

Multiple. Multiple Spark Plugs May Mean More Power. Aerial Age, vol. 16, no. 6, June 1923, p. 265, 1 fig. Conclusions based on tests carried out at McCook Field to determine effect of variation in position and number of spark plugs.

SPRINGS

Leaf. Manufacture of Leaf Springs, Edward K. Hammond. Machy. (N. Y.), vol. 29, no. 10, June 1923, pp. 769–771, 4 figs. Methods used in making automobile springs at plant of Perfection Spring Co., Cleveland, O.

The Manufacture and Inspection of Leaf Springs, H. G. Peebles. Am. Soc. Steel Treating—Trans., vol. 3, no. 9, June 1923, pp. 907–917, 20 figs. Manufacture of leaf springs for automotive industry; discusses various microstructures and imperfections found in spring steels, and describes manufacturing methods, furnaces, electrical control of furnaces, mechanical quenching machines and final capacity testing of springs.

STANDARDIZATION

Automobile Parts. Eliminating Needless Cost and Confusion, D. G. Baird. Indus. Management (N. Y.), vol. 65, no. 6, June 1923, pp. 334–337, 2 figs. How General Motors Corp. reduced number of parts in its products from 13,000 to 2100.

Railways. Simplification—The New Fundamental in Business, Ray M. Hudson. Ry. Rev., vol. 72, no. 23, June 9, 1923, pp. 962–963, 1 fig. Significance of standardization to railways as largest consumers and transporters of materials.

STEAM

Generation. Some Elements of Efficient Steam Generation, David Brownlie. Combustion, vol. 8, no. 4, Apr. 1923, pp. 237–241, 2 figs. Continuous flue-gas analysis.

STEAM-ELECTRIC PLANTS

Asbestos Mill. New Johns-Manville Power Plant Designed by Staff Engineers. Power Plant Eng., vol. 27, no. 12, June 15, 1923, pp. 609–618, 20 figs. New plant built for manufacture of asbestos products supplied by 4100 hp. of boiler capacity and 5000 kva. generator capacity.

Detroit Edison. New Marysville Plant Handles Increasing Demand, Paul W. Thompson. Power Plant Eng., vol. 27, no. 11, June 1, 1923, pp. 573–580, 7 figs. Two units at new Detroit Edison plant are supplied by four 2821-hp. boilers; details of coal handling, boiler, turbine and condenser rooms, switch house and auxiliary system; operation.

Hell Gate, New York. Alternating Current in New York, Frank W. Smith. Elec. World, vol. 81, no. 21, May 26, 1923, pp. 1196–1199, 4 figs. Additions to Hell Gate station of United Elec. Light & Power Co.; interesting features of new equipment.

Lansing, Mich. Municipal Power Plant, O. E. Bulkeley. Power, vol. 57, no. 25, June 19, 1923, pp. 968–976, 7 figs. Plant operated by Board of Commissioners; initial installation, 25,000 kw.; steam supplied to turbines at 275-lb. pressure and 200-deg. superheat; six 15,000-sq. ft. V-type boilers, each fired by 16 retort underfeed stokers.

Nechells, England. The Birmingham Corporation Electricity Undertaking. Elec. Rev., vol. 92, nos. 2374 and 2375, May 25 and June 1, 1923, pp. 819–821 and 859–861, 16 figs. Details of new Nechells generating station.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 128

Unions
* Crane Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Unloaders, Car
Link-Belt Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Edward Valve & Mfg. Co.
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
United States Rubber Co.

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Fulton Co.
* Jenkins Bros.
* Simplex Valve & Meter Co.
* Smith, H. B. Co.

Valves, Air, Relief
* Fulton Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Altitude
* Simplex Valve & Meter Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
* Crane Co.
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co.

Valves, Blow-off
* Ashton Valve Co.
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co. Elliott Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Butterfly
* Chapman Valve Mfg. Co.
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Valves, Check
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
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* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Electrically Operated
* Chapman Valve Mfg. Co.
* Dean, Payne (Ltd.)
* General Electric Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Exhaust Relief
* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.

Valves, Float
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Simplex Valve & Meter Co.

Valves, Foot
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Worthington Pump & Machy. Corp'n

Valves, Gate
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Vogt, Henry Machine Co.

Valves, Hose
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Hydraulic
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Hydraulic Operating
* Chapman Valve Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Plug
* Chapman Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Nordberg Mfg. Co.
United States Rubber Co.

Valves, Radiator
* American Radiator Co.
* Crane Co.
* Dean Payne (Ltd.)
* Fulton Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Radiator, Packless
* American Radiator Co.
* Fulton Co.

Valves, Reducing
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co. Elliott Co.
* Fulton Co.
* Kieley & Mueller (Inc.)

Valves, Regulating
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Edward Valve & Mfg. Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Simplex Valve & Meter Co.

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Stop & Check
(See Valves, Non-Return)

Valves, Superheated Steam (Steel)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros. Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Thermostatically Operated
* Dean, Payne (Ltd.)
* Fulton Co.

Valves, Throttle
* Crane Co.
* Hooven, Owens, Renstchler Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Ventilating Systems
* American Blower Co.
Clarage Fan Co.

Voltmeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Vulcanizers
* Bigelow Co.
New Haven Boiler Works (Inc.)

Wash Bowls
Manufacturing Equipment & Engrg. Co.

Washers, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Water Columns
* Ashton Valve Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Water Purifying Plants
* Graver Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.
Wayne Tank & Pump Co.

Water Wheels
(See Turbines, Hydraulic)

Waterbacks, Furnace
Green Engineering Co.

Waterproofing Materials
* Johns-Manville (Inc.)
Texas Co.

Wattmeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Welding and Cutting Work
Linde Air Products Co.

Welding Equipment, Electric
* General Electric Co.

Wheels, Car
* Fuller-Lehigh Co.

Wheels, Polishing Paper
Rockwood Mfg. Co.

Whistles, Steam
* Ashton Valve Co.
Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Winches
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.

Wire, All Metals
Driver-Harris Co.

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Flat
* Roebling's, John A. Sons Co.

Wire, Iron and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* General Electric Co.
* Roebling's, John A. Sons Co.
United States Rubber Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

Worm Gear Drives
* Cleveland Worm & Gear Co.
* Foote Bros. Gear & Mach. Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A., Fdy. & Mach. Co.
Link-Belt Co.

Wrenches
* Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Pittsburgh, Pa. Development of the Colfax Station of the Duquesne Light Company, J. M. Graves. Elec. Jl., vol. 20, no. 6, June 1923, pp. 198–201, 3 figs. Program for extension of Colfax Station makes provision for addition of a 60,000-kw. unit, consisting of two independent turbo-generators of 30,000-kw. capacity each, with a high-tension transformer unit; details of present and new equipment.

Pueblo, Colo. New Plant for Pueblo, Colorado. Power, vol. 57, no. 24, June 12, 1923, pp. 922–926, 6 figs. Initial 7500-kw. unit of modern turbine plant installed; special coal and ash handling; evaport or system for make-up water; unique method of driving circulating-water tunnel.

STEAM ENGINES

High-Vacuum. Vacuum and Reciprocating Engines, D. C. McNair. Practical Engr., vol. 67, no. 1889, May 10, 1923, pp. 261–262, 1 fig. Points out that with reciprocating engines there is decided limit beyond which vacuum should not be forced, and explains reason for this limitation.

Reciprocating. Latest Development in Reciprocating Steam Engines From the Thermoelectric Standpoint (Die letzte Entwicklung der Kolbendampfmaschine vom warmetechnischen Standpunkt betrachtet). P. Stephan. Wärme, vol. 46, no. 15, Apr. 13, 1923, pp. 151–154, 10 figs. Clearance; entropy-temperature diagram; compound engines; marine engines; superheating d. c. machines.

STEAM PIPES

High-Pressure. Valves and Piping for High Pressure Steam Lines, D. H. Skeen. Power Plant Eng., vol. 27, no. 11, June 1, 1923, pp. 565–566, 3 figs. Steam pressures of 600 to 1200 lb. and correspondingly high temperatures have brought about radical changes.

STEAM TRAPS

Michaelis. An Improved Michaelis Steam Trap, C. C. W. Ganswijk. Int. Sugar Jl., vol. 25, no. 290, Feb. 1923, pp. 71–72, 1 fig. Describes improved apparatus for removal of condensed water from steam drums of evaporators.

STEAM TURBINES

Leakage in Multi-Stage Impulse. Diaphragm Leakage in Multistage Impulse Turbines, Albert J. Jadot, Sibley Jl. Eng., vol. 37, no. 5, May 1923, pp. 110–114, 6 figs. Calculation of losses due to leakage.

Reaction. Reaction Turbine Uses Axial Clearance in High-Pressure Blading. Power, vol. 57, no. 22, May 29, 1923, pp. 839–841, 7 figs. New features incorporated in design of 5000-kw. turbines installed in municipal plant of Ashtabula, O.

Valve Gears, Hunting of. Steam-Turbine Governor and Valve Gears—Characteristics of Hunting, Eustis H. Thompson. Power, vol. 57, nos. 23, 24 and 25, June 5, 12 and 19, 1923, pp. 898–901, 2 figs., 931–933, 2 figs. and 984–986, 4 figs. June 5: Governor operation with slow changes of load is contrasted with difficulties encountered when sudden large load variations occur; general conditions known as "hunting" affects a.c. and d.c. units differently. June 12: Additional causes of hunting. June 19: Special troubles of hydraulic and mechanical types.

STEEL

Alloy Steels. See ALLOY STEELS.

Automobile Sheets, Defects in. Defects in Automobile Steel Sheets, George F. Comstock. Iron Age, vol. 111, no. 21, May 24, 1923, pp. 1475–1480, 39 figs. Causes explained by metallographic examination of 20 samples.

Carbon Migration to Ingot Iron. Migration of Carbon from Steel to Ingot Iron, O. Z. Klopsch and H. F. Roberts. Am. Soc. Steel Treating—Trans., vol. 3, no. 8, May 1923, pp. 855–863, 16 figs. Points out possibilities of obtaining quantitative results of rate of migration and depth of penetration; results obtained show definitely that there is transfer of carbon from steel to carbonless ingot iron. Photomicrographs.

Crystallization, Delayed. Delayed Crystallization in the Carbon Steels—The Formation of Pearlite, Troostite, and Martensite, A. F. Hallimond. Am. Soc. Steel Treating—Trans., vol. 3, no. 9, June 1923, pp. 931–943, 1 fig. Deals with application of supersaturation theory of steel. Bibliography.

Fatigue Tests. Some Fatigue Tests on Spring Steels, R. E. Lewton. Am. Soc. Steel Treating—Trans., vol. 3, no. 9, June 1923, pp. 944–953, 11 figs. Outlines procedure and subsequent results of tests made with view of determining suitable means of comparing different types of spring steels.

The Mechanics of the Wöhler Rotating Bar Fatigue Test, W. Mason. Engineering, vol. 115, no. 2996, June 1, 1923, pp. 698–699, 5 figs. Relation between lateral deflection and deflection in plane of bending of Wöhler rotating bar is discussed and attempt is made to ascertain if there is constant ratio between lateral deflection and width of hysteresis loop.

Spark Tests. Spark Tests for Steel, S. P. Rockwell. Machy. (N. Y.), vol. 29, no. 10, June 1923, pp. 779–780, 2 figs. Describes application of spark test.

STEEL CASTINGS

Grinding. Grinding Manganese-Steel Castings, Howard Campbell. Am. Mach., vol. 58, no. 22, May 31, 1923, pp. 783–786, 11 figs. Grinding operations on manganese steel parts; grinding machines made out of lathes, planers and boring machines; methods and equipment.

STEEL, HEAT TREATMENT OF

Tempering. Tempering Very Soft Steel at Very High Temperature (Sur la faculté de trempe de l'acier extrafoux à très haute température), M. Sauvageot and H. Delmas. Académie des Sciences—Comptes Rendus des Séances, vol. 176, no. 19, May 7, 1923, pp. 1310–1313. As carbon content of steels decreases, critical temperature of tempering rises very rapidly and martensite obtained has decreasingly small hardness, hence it is often impossible to harden pure iron at very high temperatures.

STEEL MANUFACTURE

Temperature, Influence of. Influence of Temperature in Steel Making Processes, Ch. Clausel. Iron Age, vol. 111, no. 24, June 14, 1923, pp. 1710–1711. Poor results follow very high working temperatures; iron oxide and its solubility; phosphorus as deoxidizer Abstracted and translated from Revue de Métallurgie, Nov. 1922.

STEEL WORKS

Solingen, Germany. The Workshops of the Seigen-Solinger Steel Casting Corp., Solingen, Germany (Die Werksanlagen des Siegen-Solinger Gussstahl-Aktien-Vereins, Solingen). Giesserei-Zeitung, vol. 20, nos. 9 and 11, Apr. 1 and May 1, 1923, pp. 143–147 and 199–204, 5 figs. History of development; details of Solingen Steel foundry, Gross-Kayna Steel works, Franklebeb steel and iron foundry and the Hagen works.

STOKERS

Underfeed. Many Features in Design of New Taylor Stoker. Power Plant Eng. vol. 27, no. 11, June 1, 1923, pp. 602–604, 3 figs. New type of H-stoker equipped with crankshaft or hydraulic drive; enclosed spur gear for crankshaft; bottom of retort formed by telescopic auxiliary pushers.

SUPERPOWER

Interconnection of Systems. Problems and Developments in the Control and Interconnection of Power Systems, H. R. Summerhayes. Gen. Elec. Rev., vol. 26, no. 6, June 1923, pp. 327–337, 8 figs. Describes problems which have to be solved when large power centers are tied together into superpower zones; control under normal and abnormal conditions.

Pacific Northwest, Survey. Superpower Survey of Pacific Northwest. Elec. World, vol. 81, no. 20, May 19, 1923, pp. 1137–1138, 2 figs. Engineering investigators find that existing interconnected power systems will, through natural expansion, prove adequate for many years to needs of that part of country.

Super-Power Survey of the Pacific Northwest. Jl. Elec. & Western Industry, vol. 50, no. 9, May 1, 1923, pp. 320–329, 14 figs. Report of committee presenting present electrical development of Washington, Idaho and Oregon and its relation to their future growth.

Sociological and Political Aspects. Superpower—A National Resource. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 6, June 1923, pp. 645–652. Contains following articles: Power and Social Progress; Paul T. Brady; The Engineering of Superpower, R. F. Schuchardt; Superpower as a National Policy, M. H. Aylesworth.

T

TERMINALS, RAILWAY

Mail-Handling Device. New Mail Handling Device at Chicago Mail Terminal. Ry. Age, vol. 74, no. 27, June 9, 1923, pp. 1385–1386, 5 figs. Describes system comprising overhead conveyor, whereby mail sacks are transported from loading dock at foot of chutes to string of mail cars and deposited into cars through any one of eight doors with aid of selective tripping device.

TEXTILE MACHINERY

Printing Machinery, Lubrication. Textile Printing Machinery and Its Lubrication. Lubrication, vol. 9, no. 5, May 1923, pp. 57–60, 3 figs. Discusses hand block printing and machine printing, and machinery used and its lubrication.

Warp Machine. The Milanese Warp Machine, Edward Murden. Textile World, vol. 63, no. 19, May 12, 1923, pp. 41 and 43, 6 figs. Description of important parts, their functions and position in cycle of operations for forming stitch; machine adjustments; making cotton Atlas cloth; fancy colored patterns in diagonal and diamond-shaped objects; limitations of fancy effects.

TEXTILE MILLS

Electric Heating. Heating a Cotton Weave Shed by Electricity, C. T. Guildford. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 6, June 1923, pp. 582–588, 9 figs. Installation of electric heating of cotton weave shed; test of excellency of methods of estimating quantity of heat required for buildings of this kind; conditions under which electric heating in textile mill may be used.

THERMODYNAMICS

Problems. Some By-Paths in the Fundamentals of Engineering, Julius Frith and Frederick Buckingham. Engineer, vol. 135, no. 3517, May 25, 1923, pp. 544–546. Discusses terms, thermal equivalent of mechanical work, and mechanical equivalent of heat, which, author claims, do not express same thing; question of obtaining energy from compressed air.

Supersaturation Limit. The Supersaturation Limit H. M. Martin. Engineering, vol. 115, no. 2994, May 18, 1923, p. 607. Author compiled new tables of properties of steam at Wilson line to replace those given in his "New Theory of the Steam Turbine."

TIME STUDY

Manual Work. Time Calculations for Manual Work (Ueber Berechnungen von Handarbeitszeiten), F. Kresta. Werkstattstechnik, vol. 17, no. 10, May 15, 1923, pp. 297–302, 14 tables. General rules for determination of time required for such work as chiseling, filing, coloring, thread cutting, etc.; empirical formulas for hand operations, based on actual experience and time studies.

TRACTORS

Farm. The General-Purpose Farm Tractor, C. M. Eason. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 597–609, 27 figs. Requirements of farm work and different types of tractor built to meet these demands; large vs. small tractors, type of drive, power needed, control, methods of operation and factors constituting general-purpose service.

Test Analysis. Nebraska Tractor-Test Analysis, Oscar W. Sjogren. Soc. Automotive Engrs.—Jl., vol. 12, no. 6, June 1923, pp. 587–594 and 609, 26 figs. Compilation of all results of tractor-testing work at University of Nebraska; author specifies equipment used, and discusses proper rating of tractors, belt speeds, weight distribution, tractive efficiency, wheel slippage, piston displacement, fuel and water consumption; comment on defects of tractors, and recommendations for remedying them.

TRADE UNIONS

Survey 1922. Trade Unionism in 1922: A Survey. Int. Labour Rev., vol. 7, no. 2–3, Feb.-Mar. 1923, pp. 252–271. Review of principal tendencies of trade-union movement during 1922, illustrated by more or less typical examples. See also reports on Trade Union Organizations, in same journal, vol. 7, nos. 4 and 5, Apr. and May 1923, pp. 541–551 and 717–722.

V

VENTILATION

N. Y. State Commission Report. The Report of the New York State Commission on Ventilation. Heat. & Vent. Mag., vol. 20, no. 5, May 1923, pp. 35–38. General plan of experiments and field investigations conducted by Commission; effect of atmospheric conditions on health, comfort and efficiency; favors window ventilation.

VOCATIONAL TRAINING

Developments. Education. Int. Labour Rev., vol. 7, nos. 2–3, 4 and 5, Feb.-Mar., Apr. and May 1923, pp. 418–442, 632–641 and 780–798. Feb.-Mar.: Vocational guidance and education in Czechoslovakia; work of Strasburg vocational guidance office in 1922; problem of vocational ability; vocational training in various countries; workers' education in various countries. Apr.: Apprentice training in Austrian metal industry, by Fritz Rager; vocational education in United States. May: Workers' education in Sweden; proposals for chambers of crafts in France; notes on vocational guidance.

VULCANIZED FIBER

Machining. Machining Vulcanized Fiber, A. B. Eastman. Machy. (N. Y.), vol. 29, no. 10, June 1923, pp. 781–782. Notes on milling fiber; turning and threading; drilling and tapping; bending and forming; punching; sawing; machining in automatic machines. Further information of machining fiber described by another manufacturer.

W

WAGES

Methods of Establishing Rates. Methods of Establishing Wage Rates and Determining Promotions, H. P. Carruth. Paper Trade Jl., vol. 76, no. 21, May 24, 1923, pp. 49–58, 7 figs. Job analysis; basis of rating; weight factors; etc. Paper read before Tech. Assn. Pulp & Paper Industry.

Minimum. Minimum Wage. Monthly Labor Rev., vol. 16, no. 5, May 1923, pp. 131–145. Minimum wage law of Arizona; brief for constitutionality and unconstitutionality of minimum-wage law of District of Columbia; new minimum-wage board in Massachusetts.

Occupational Rating Plan. The Occupational Rating Plan of the International Harvester Company, Arthur H. Young. Management Eng., vol. 4, no. 5, May 1923, pp. 301–306, 6 figs. Method adopted is one of purely relative values, taking prevailing community rate for common labor as base; over 900 occupations have been so classified.

Payment by Results. The Future of Payment by Results, J. E. Powell. Jl. Indus. Administration, vol. 2, no. 15, Mar. 1923, pp. 67–80. Real object of payment by results; acceptability of principle; difficulties in application; influence of past practice; possibilities of stronger policy; supposed failure of individual systems.

Standard-Hour System. The Standard-Hour Plan of Wage Payment, M. E. Merriman. Management Eng., vol. 4, no. 6, June 1923, pp. 381–387. How it compares in clerical cost with other systems.

Economics. Water Power, Charles W. Kellogg. Boston Soc. Civ. Engrs.—Jl., vol. 10, no. 6, June 1923, pp. 255–266. Fundamentals in relation of water power to coal and economics of water power in general.

B R A S S

It will be recalled that Magellan, most daring of explorers, was killed in the Philippines in 1521. His Brass helmet, handed down from generation to generation by Moro chieftains, was only recently discovered.

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(See also page 570 of this issue for supplementary items.)

ABRASIVE WHEELS

Breakages. Grinding Wheel Breakages—Cause and Prevention, H. W. Wagner. Can. Machy., vol. 29, no. 26, June 28, 1923, pp. 19–20. Theory of cooling strains; calculation of centrifugal forces; uniformity of bearing surfaces; cross bending stress, etc.

Buffing Wheels. The Manufacture of Buffing Wheels, Bradford H. Divine. Machy. (N. Y.), vol. 29, no. 11, July 1923, pp. 881–885, 4 figs. Materials used for buffing wheels; need for standardization of wheels; importance of aging buff; converting cloth into buffs; design of buffs; special forms of buffing wheels.

ACCIDENT PREVENTION

Legislation. Proceedings of the Ninth Annual Meeting of the International Association of Industrial Accident Boards and Commissions. U. S. Dept. Labor: Bur. Labor Statistics no. 333, May 1923, 336 pp. Papers and discussions on forms and procedure for workmen's compensation, standard permanent disability schedules, medical problems, accident prevention, legislation and administration.

ACCOUNTING

Small Plants. Bookkeeping for the Small Plant, C. J. Morrison. Am. Mach., vol. 59, no. 1, July 5, 1923, pp. 19–21, 4 figs. Requirements for setting up bookkeeping system; numbering accounts, checks and stubs; making entries in purchase book and ledger; drawing up statements.

AERONAUTICAL INSTRUMENTS

Steering Equipment for. Aeronautical Instruments, Kurt Bennewitz. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 145, June 1923, 13 pp., 7 figs. on supp. plates. Points out that suitable outfit for steering consists of (1) transverse inclinometer (pendulum or level); (2) longitudinal inclinometer (pressure speed meter); (3) turn meter for large airplanes (Drexler steering indicator, for small airplanes, (probably an improved pressure turn meter). Translated from Technische Berichte, vol. 3, no. 5.

AERONAUTICS

South America. An Aeronautical Survey of South America. Aviation, vol. 15, no. 1, July 2, 1923, pp. 14–16. Opportunities for constructors, pilots, etc. Abstract of lecture by G. F. Luke before Scottish Branch of Roy. Aero. Soc.

AIR COMPRESSORS

Rotary. The Planche System Rotary Compressor (Le compresseur rotatif, système Planche), R. Chenal. Genie Civil, vol. 82, no. 24, June 16, 1923, pp. 569–574, 15 figs. Details of design and construction; comparison with various compressor systems, particularly that of rotary vanes.

Types. Air Compressor and Cargo Oil Pump. Engineering, vol. 115, no. 2999, June 22, 1923, pp. 772–773, 3 figs. Details of air compressor, cargo oil pump, and turbine-driven circulating pump constructed by G. and J. Weir, Glasgow.

AIR CONDITIONING

Industrial Stenches, Abatement of. Abatement of Industrial Stenches by Means of Activated Carbon, Arthur B. Ray and N. K. Chaney. Chem. & Met. Eng., vol. 28, no. 25, June 25, 1923, pp. 1114–1116, 2 figs. Review of previous efforts at eliminating industrial stenches and description of installation using activated carbon that successfully cured stench nuisance in rendering plant. Paper read before Am. Inst. Chem. Engrs.

Pottery Shops. Atmospheric Conditions in Potters' Shops and the Efficiency of various Types of Drying Stoves, H. M. Vernon. Ceramic Soc.—Trans., vol. 22, part 1, 1923, pp. 70–84 and (discussion) 84–89, 9 figs.

AIR FURNACES

Oil Burning. Fuel Oil for Air-Furnace Melting, D. L. Dobson. Iron Age, vol. 112, no. 1, July 5, 1922, pp. 5–6, 1 fig. Equipment at Samson Tractor Co. plant at Waukesha, Wis.; costs of oil and coal operation compared.

Melts with Oil in Air Furnace, D. I. Dobson. Trade Rev., vol. 73, no. 1, July 5, 1923, pp. 33–34 and 41, 1 fig. Coal-burning furnaces used to melt malleable with slight changes in combustion chamber; figures given showing relative cost of coal and oil firing; oil consumption.

AIRCRAFT

Development. Aircraft Development since the Armistice. Aviation, vol. 15, no. 1, July 2, 1923, pp. 6–9. Development of pursuit, attack, observation, bombardment, training, and special types. Prepared by Engineering Division, U. S. Army Air Service, McCook Field, Dayton, Ohio.

AIRPLANE ENGINES

Accessories. Accessories in the Propulsion Group (Les accessoires du groupe motopropulseur), Martinot-Lagarde. Aéronautique, vol. 5, no. 48, May 1923, pp. 185–193, 15 figs. Apparatus at recent aeronautical exposition. Starting and starting devices; supply of gasoline to engine; engine cooling.

Carburetors. See CARBURETORS.

Liberty. Test to Determine Minimum Fuel Head to Operate Liberty "12" Engine on Propeller Load, J. M. Miller. Air Service Information Circular, vol. 5, no. 422, Apr. 1, 1923, 3 pp., 2 figs. Test to determine minimum fuel heat at carburetor required for normal operation of engine fitted with Zenith U. S. 52 carburetors.

Reconditioning. Reconditioning Airplane Motors at Fairfield, Fred H. Colvin. Am. Mach., vol. 58, no. 26, June 28, 1923, pp. 929–932, 11 figs. How motors are dismantled, parts repaired, reassembled and tested ready for service; salvaging parts of motors for future use; testing timing.

Supercharging. Machinery Equipment for Flight at High Altitudes (Machine installatie van het verkeers-hoogtevliegtuig), B. L. Voskuil. Ingenieur, vol. 38, no. 20, May 19, 1923, pp. 390–393, 7 figs. Discusses as example machine flying at 13,000 m. altitude with 400-hp. Liberty engine, oxygen supply, overdimensioning, supercharging and supercompressing of various types.

AIRPLANES

Airfoils. The Fairing of Airfoil Contours, Edward P. Warner. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 146, June 1923, 7 pp., 4 figs. Discusses methods of fairing.

All-Metal. A New French All-Metal Aeroplane. Flight, vol. 15, no. 22, May 31, 1923, pp. 289–290, 3 figs. Details of the Michel Wibault 3 C. I. Span, 38 ft. 7 in.; length overall, 26 ft. 7 in.; wing area, 285 sq. ft.; weight empty, 2100 lb.; weight loaded, 3085 lb.; speed at 6500 ft., 152 mi. per hr.

Bombers. Barling Bomber is Ready for Trial Flights. Aviation, vol. 15, no. 2, July 9, 1923, pp. 38–40, 6 figs. Design and constructional features of Barling bomber triplane; wing spread from tip to tip 120 ft., height 28 ft., overall length 65 ft.; six 400-hp. Liberty engines.

Commercial, Effective Load. Effect of Minimum Security on Effective Load of Commercial Airplanes (Influence des conditions minima de sécurité sur la charge utile des avions de transport), J. Sabatier. Aéronautique, vol. 5, no. 48, May 1923, pp. 210–215. General reduction of effective load with application of safety devices; analysis of conditions of security; fatigue of materials; calculation of effective load for given airplanes.

Control Devices. The Constantin Vane (La girouette Constantin), J. Felix. Nature (Paris), no. 2567, June 16, 1923, pp. 379–384, 9 figs. Describes new type having two curved surfaces, and its successful applications in aerial navigation, such as indicating angle of attack, lateral sliding, veering of plane, etc.

Express Freight, Design of. Aerial Express Service Will Demand Special Plane Designs, Archibald Black. Automotive Industries, vol 49, no. 2, July 12, 1923, pp. 68–70, 3 figs. Convertible passenger machines do not meet all requirements; maximum carrying space must be provided; location of pilot is important, but place in rear seems to have most advantages; plywood best material for body construction; table giving weights per cu. ft. for a list of packages selected at random as typical of variations to be expected in shipments.

Fokker. Performance Test of Fokker TW-4 Equipped with Curtiss OX-5 Engine. Air Service Information Circular, vol. 5, no. 414, Apr. 1, 1923, 5 pp., 6 figs. Summary of results; distribution of weights; pilot's observations; description of airplane and power plant.

Gnosspelius Light. The Gnosspelius Light 'Plane. Flight, vol. 15, no. 22, May 31, 1923, pp. 292–295, 7 figs. Equipped with 700 cc. Blackburne engine; body is streamline structure; weight, 530 lb.; maximum speed, 70 mi. per hr.

Heinkel Convertible. A German Convertible Machine. Aeroplane, vol. 24, no. 24, June 13, 1923, pp. 440 and 442, 6 figs. Heinkel H. E. 3 cantilever monoplane of low-wing type, built of wood, seating 3 persons, and intended for school or joy-ride purposes; readily convertible from seaplane to land machine.

Huff-Daland. Performance Test of Huff-Daland TA-2, Equipped with Curtiss OX-5 Engine. Air Service Information Circular, vol. 5, no. 407, Apr. 1, 1923, 4 pp., 5 figs. Summary of results; distribution of weights; pilot's observation; description of airplane and power plant.

Pursuit. Design Characteristics for Most Suitable Pursuit Airplanes, Leslie MacDill and F. W. Herman. Air Service Information Circular, vol. 5, no. 436, May 1, 1923, 7 pp., 9 figs. Selection of most suitable engine, wing section and wing loading to obtain most desirable performance for single-seater, low-altitude, water-cooled, pursuit airplanes.

Seaplanes. See SEAPLANES.

Stability. A Study of Longitudinal Dynamic Stability in Flight, F. H. Norton. Nat. Advisory Committee for Aeronautics—Report, no. 170, 1923, 7 pp., 14 figs. Results of investigation show that engine

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
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Associated (Assoc.)
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Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 136

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Machy. Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Midwest Steel & Supply Co. (Inc.)

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Elec & Mfg. Co.
Weston Electrical Instrument Co.

Anchorages, Overhead Transmission
Midwest Steel & Supply Co.

Anemometers
Taylor Instrument Cos.

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
Green Engineering Co.
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Babbit Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdy. & Mach. Co.
* Timken Roller Bearing Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Dixon, Joseph Crucible Co.
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Leatner
American Sole & Belting Leather Tanners (Inc.)

Belting, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Machy. Co.

Blocks, Tackle
Clyde Iron Works Sales Co
* Roebling's, J. A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n

Blowers, Steam Jet
* Schutte & Koerting Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Boiler Baffles
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Boiler Compounds
Dixon, Joseph Crucible Co.
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co
* Davis, J. F. & Sons Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Connelly, D. Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
Webster, Howard J.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Davis, J. F. & Sons Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Box Rails
Midwest Steel & Supply Co. (Inc.)

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Brick, Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.
Link-Belt Co.

Bridgewalls (Furnace)
McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Cars, Charging
Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

speed has as much effect on period and damping as air speed, and that, contrary to theory as developed for small oscillations, damping decreased at higher air speeds with closed throttle.

Longitudinal Stability of Airplanes (Zur Längsstabilität der Flugzeuge), Georg König. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 14, no. 7–8, Apr. 26, 1923, pp. 61–64, 8 figs. Characteristics of steering apparatus; thrust of propellers and its equalization; stability of sustaining surfaces; stability diagram.

Tail-Skid Impact Test. Impact Test of a JN-4 Tail Skid and Landing Chassis, D. B. Weaver. Air Service Information Circular, vol. 5, no. 409, Apr. 1, 1923, 3 pp., 3 figs. Conducted for purpose of determining height from which both tail skid and landing chassis could be dropped before failure.

AIRSHIPS

Engines. Packard Model 1551 300 hp. Airship Engine, J. G. Vincent. Aviation, vol. 14, no. 26, June 25, 1923, pp. 686–687, 4 figs. Details of engines which will drive Navy's airship ZR1, and are being built by Packard Motor Car Co.; they are of 6-cylinder in-line vertical type, water-cooled, and have bore of 6⅝ in. with stroke of 7½ in.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Bearing-Metal. See BEARING METALS.

Brass. See BRASS.

Permalloy. Permalloy, H. D. Arnold and G. W. Elmen. Electrician, vol. 90, no. 2353, June 22, 1923, pp. 672–674, 7 figs. Nickel-iron alloys, which when properly heat-treated, possess remarkable magnetic properties.

Segregation. Some Cases of the Segregation in Alloys [Einige Fälle von Entmischung (Saigerung) bei Legierungen], W. J. van Heteren and J. W. A. Haagen Smit. Metall u. Erz., vol. 20, no. 10, May 22, 1923, pp. 183–187, 4 figs. Segregation in binary alloys, gold-silver, gold-copper, silver-copper; solidification curves and tables of data.

Solid Solutions. Solid Solutions, Walter Rosenhain. Am. Inst. Min. & Met. Engrs.—Trans., no. 1250-N, June 1923, 32 pp., 8 figs.; also (abstract) in Min. & Metallurgy, vol. 4, no. 198, June 1923, pp. 306–307. Relates to internal structure and constitution of solid solutions; describes various ways in which alloys solidify and manner in which solid solutions are formed, pointing out that essentially all constituents of alloys are solid solutions.

ALUMINUM ALLOYS

Duralumin. See DURALUMIN.

Founding. The Founding of Aluminium Alloys. Metal Ind. (Lond.), vol. 22, no. 24, June 15, 1923, pp. 611–613, and 622. Lightness of aluminium, dry and green sand cores, melting and pouring, temperature control, checking and drawing, hard spots, iron content, and machining aluminium alloys.

AMMONIA COMPRESSORS

Motive Power for. Refrigerating Machinery, William Sinclair and Alfred Snashall. Indus. Australian and Min. Standard, vol. 69, nos. 1794, 1795 and 1796, Apr. 19, 26 and May 3, 1923, pp. 630, 671, and 615–616. Motive power for ammonia compressors. Refrigeration and power calculations; gas and oil engines; electric driving. Abstract of paper read before Inst. Engrs.

AMMUNITION

Small-Arms. Mass Production of Small Arms Ammunition, H. W. Starkweather. Army Ordnance, vol. 3, no. 18, May-June, 1923, pp. 331–333. Relation of Peters Cartridge Company to manufacture of war ammunition.

Modern Impfovements in Small Arms Powders, L. C. Weldin. Army Ordnance, vol. 3, no. 18, May-June, pp. 342–345, 3 figs. Nitroglycerine and nitrocellulose powders; other types and manufacturing processes.

APPRENTICES, TRAINING OF

Foundry. Technical School an Aid to Foundry Apprentice, F. H. Bell. Can. Foundryman, vol. 15, no. 6, June 1923, pp. 13–15 and 19, 5 figs. Need and advantages of a technical school education to foundry apprentice; describes, as an example of layout, equipment, and management, Montreal Technical School, Montreal, Canada.

Railway. The Modern Plan for Training Apprentices, John Purcell. Ry. Rev., vol. 72, no. 25, June 23, 1923, pp. 1071–1073. Scarcity of skilled mechanics has led railways to progressive plan for educating and training apprentices in shops.

Training of Railway Apprentices, Z. R. Nissar. Indian Industries & Power, vol. 20, no. 7, Mar. 1923, pp. 246–247. Scheme of organization and training.

ARTILLERY

Anti-Aircraft. Recent Developments in Antiaircraft Matériel, Aaron Bradshaw, Jr. Coast Artillery Jl., vol. 58, no. 5, May 1923, pp. 424–455, 20 figs. Points out urgent needs of anti-aircraft service and outlines what progress has been made in solving problems.

ATOMS

Alpha Particles. The Life History of an Alpha Particle, Ernest Rutherford. Engineering, vol. 115, no. 2999, June 22, 1923, pp. 769–770, 6 figs. Account of latest researches. (Abstract.) Address before Roy. Instn.

AUTOGENOUS WELDING

Aluminum Castings. The Autogenous Welding of Broken Aluminium Castings. Mech. World, vol. 73, no. 1902, June 15, 1923, pp. 375–376. Possibilities of autogenous welding for aluminum castings; points to be observed.

AUTOMOBILE ENGINES

Delage 100-B.Hp. 100 B.Hp. from Lilliputian Cylinders. Autocar, vol. 50, no. 1441, June 1, 1923, pp. 932–933, 5 figs. Some details of the 2-liter 12-cylinder Delage engine for Grand Prix Race.

Mixture Requirements, Effect of Speed on. The Effect of Speed on Mixture Requirements, Claude S. Kegerreis and Gilbert A. Young. Purdue Univ. Eng. Experiment Station, Bul. no. 11, vol. 7, no. 3, Feb. 1923, 29 pp., 16 figs. Results of investigation to establish mixture ratios required by an automobile engine, as effected more especially by speed and fuel-air ratios required by an internal-combustion engine of throttling type at any speed and load condition; description of apparatus.

Pistons. See PISTONS.

Sleeve-Valve. Sleeve-Valve Engines, E. B. Wood. Automobile Engr., vol. 13, no. 177, June 1923, pp. 183–188, 13 figs. Discusses interesting features of this type of engine, and its advantages; deals with double-sleeve type as exemplified by Knight engine used by Daimler, Minerva, etc.; single-sleeve type as exemplified by Burt-McCollum patents; and Howard cuff-valve, or split-sleeve type.

Supercharging. Super-Charging Small Engines. Autocar, vol. 50, no. 1444, June 22, 1923, pp. 1103–1104, 2 figs. How application of forced induction to a 4-cylinder engine of 1568 cc. improves power output.

AUTOMOBILE FUELS

Distillation Curves. Distillation Curve Becoming Generally Used As Motor Fuel Index, J. C. Chatfield. Nat. Petroleum News, vol. 15, no. 23, June 6, 1923, pp. 34–36, 12 figs. Presents curves of 11 different grades of motor fuel.

Gasoline. See GASOLINE.

Mixed, Use of Acetone in. The Use of Acetone in Composite Engine-Fuels, R. F. Remler. Soc. Automotive Engrs.—Jl., vol. 13, no. 1, July 1923, pp. 23–24. Chemical structure of acetone; comparative heating values of acetone and ethyl alcohol; properties of acetone; its advantages as a fuel.

Tests. Winter Tests Show Lower Mileage with Heavy Fuels, H. C. Dickinson and John A. C. Warner. Soc. Automotive Engrs.—Jl., vol. 13, no. 1, July 1923, pp. 87–92, 3 figs. Results of tests made by Research Dept. of Soc. Automotive Engrs. under winter conditions of 1923 to determine whether relative fuel mileages for different fuels are dependent on temperature at which car operation is conducted.

Volatility. Economic Motor-Fuel Volatility, Stephen M. Lee. Soc. Automotive Engrs.—Jl., vol. 13, no. 1, July 1923, pp. 3–15, 28 figs. Progress report of fuel investigation being conducted by Bur. of Standards, in cooperation with Am. Petroleum Inst., Nat. Automobile Chamber of Commerce and Soc. Automotive Engrs., to secure data to be used in estimating effect of changes in gasoline volatility on fuel consumption of cars; description of fuels used, test cars, apparatus, tests and test methods.

AUTOMOBILE MANUFACTURING PLANTS

A. C. Works, England. Light Car Production. Automobile Engr., vol. 13, no. 177, June 1923, pp. 174–177, 11 figs. Methods employed in factory of A. C. Cars, Ltd.

Engineers' Service. The Factory Engineering-Staff and Its Relation to Service, J. W. Lord. Soc. Automotive Engrs.—Jl., vol. 13, no. 1, July 1923, pp. 93–95 and (discussion) 95–100. Considers service problems, fundamental in character, that must be solved at point where vehicle is designed and produced; problems due to inaccessibility of parts, repairs and repair parts; influence that factory engineer has and can have on service; makes recommendation that engineers be given greater opportunity to see product in field.

AUTOMOBILES

Alvis. A Super-Sports Alvis. Autocar, vol. 50, no. 1445, June 29, 1923, pp. 1149–1150, 6 figs. Eighty miles an hour easily within reach of new overhead valve engine, it is claimed; aluminum coachwork.

Ariel Nine. The Ariel Nine. Auto-Motor Jl., vol. 28, no. 26, June 28, 1923, pp. 533–536, 11 figs. Opposed twin engine and simple and direct transmission. Overall length, 10 ft. 9 in.; wheelbase, 7 ft. 7 in.; running weight, 11 cwt.

Belsize-Bradshaw. A Two-Litre Belsize-Bradshaw. Autocar, vol. 50, no. 1441, June 1, 1923, pp. 943–945, 8 figs. Describes 4-cylinder 4-seater car; multi-disk clutch combined with three-speed gear box.

Bodies. Automobile Bodies are Finished with Abrasives, Fred B. Jacobs. Abrasive Ind., vol. 4, no. 7, July 1923, pp. 211–213, 4 figs. Entire body surface first smoothed with abrasive cloth; undercoats applied successively and rubbed with pumice and rotten stone; varnish coats oil sanded; final coat of varnish receives no rubbing.

Brakes, Front-Wheel. American Front Wheel Brake Design Making Rapid Strides, Herbert Chase. Automotive Industries, vol. 48, no. 26, June 28, 1923, pp. 1364–1374, 17 figs. Several are said to have commendable features not found in European products; some are operated by hydraulic pressure, but majority use mechanical actuation; "servo" mechanisms are conspicuously absent.

Braking, Four-Wheel. Four-Wheel Braking Systems. Soc. Automotive Engrs.—Jl., vol. 13, no. 1, July 1923, pp. 55–59, 7 figs. Two articles: Mechanical Braking on Four Wheels as a Present Automotive Necessity, by Alvin M. Yocum; and Renault Mechanical Four-Wheel Braking-System, by Marcel Guillelmon.

Crouch. The 12/24 Hp. Crouch Chassis. Automobile Engr., vol. 13, no. 177, June 1923, pp. 162–169, 16 figs. Fitted with proprietary 4-cylinder, water-cooled engine, drive being taken through cone clutch to three-speed gear box attached to torque tube, final drive being through spiral bevels.

F. N. Type. New 10 Hp. F. N. Autocar, vol. 50, no. 1445, June 29, 1923, pp. 1163–1164, 3 figs. Belgian chassis on standard lines designed for hard work at low running costs.

Fuel-Consumption Meters. Measuring Petrol Consumption. Autocar, vol. 50, no. 1442, June 8, 1923, pp. 989–990, 3 figs. Describes Aga gasoline consumption meter, manufactured by Gas Accumulator Co., Eng., an instrument which conveys fuel from tank to carburetor, registers every tenth of a gallon consumed by engine, indicates quantity of fuel remaining in tank, and filters fuel before it enters carburetor.

Headlights. Bureau of Standards Tests Reveal Many Defective Headlamps, T. S. Sligh, Jr. Automotive Industries, vol. 49, no. 2, July 12, 1923, pp. 71–73, 1 fig. Examination of equipment on 400 cars selected at random shows 54 per cent of glaring lights; bulbs on 73 per cent are found out of focus; reduction of glare results in better illumination; great need for education in care and adjustment of headlamps.

Importance of Better Automobile Head-Lamps and Proper Adjustment, R. N. Falge and W. C. Brown. Soc. Automotive Engrs.—Jl., vol. 13, no. 1, July 1923, pp. 25–29, 9 figs. Tests made with common type of head lamp with a parabolic reflector to show effects produced by placing source of light in different positions; describes type of lens that will compensate for commercial variations in position of filament and at same time distribute light effectively, converging or diverging rays laterally while maintaining top or cut-off substantially at level of head lamp; requirements for uniform and satisfactory service of lamps and such parts as filaments, sockets, reflectors, lenses, etc.

Horstman. The Horstman Light Car. Auto-Motor Jl., vol. 28, no. 24, June 14, 1923, pp. 491–494, 12 figs. Designed with careful attention to comfort and accommodation; 11.9 hp. 4-cylinder thermo-siphon-cooled Anzani engine.

Hotchkiss. The 15.9 Hp. Hotchkiss. Auto-Motor Jl., vol. 28, no. 22, May 31, 1923, pp. 449–452, 12 figs. Particulars of new type A. M. Hotchkiss car; 4-cylindered engine with bore of 80 mm. and stroke of 120 mm.; actual horsepower is 48 hp. at 3000 r.p.m.

Humber. The 15.9 Hp. Humber. Auto-Motor Jl., vol. 28, no. 25, June 21, 1923, pp. 511–514, 12 figs. Engine is a separate unit, with monobloc cylinders; overhead inlet valves; four cylinders; wheelbase 10 ft. 3½ in.

Lagonda. Unit Body and Chassis Construction Features British Lagonda, M. S. Bourdon. Automotive Industries, vol. 49, no. 2, July 12, 1923, pp. 62–63, 3 figs. Details of chassis and body of car embodying new system for which is claimed lower cost of chassis and body and far greater rigidity.

Racing, Influence on Touring Models. How Racing Influences Touring Cars, Louis Coatalen. Autocar, vol. 50, no. 1441, June 1, 1923, pp. 939–941, 4 figs. Lessons learned and data obtained from speed cars are having a marked effect on design of touring models and their cost of operation.

Rear-Axle Worm Shafts. Rear Axle Worm-Shafts, D. Cecil M'Intosh. Automobile Engr., vol. 13, no. 177, June 1923, pp. 172–173, 8 figs. Investigation of their deflection under load.

Steering Gears. Recent Steering Gear Designs. Automotive Industries, vol. 48, no. 26, June 28, 1923, pp. 1404–1405, 6 figs. Mechanical drawings showing recent development in steering wheels.

Tire Carriers. A Few Interesting Tire Carriers. Automotive Industries, vol. 48, no. 26, June 28, 1923, pp. 1398–1401, 14 figs. Mechanical drawings showing recent developments.

Tires. See TIRES, RUBBER.

AVIATION

Airways and Landing Facilities. Airways and Landing Facilities. Air Service Information Circular, vol. 5, no. 404, Mar. 1, 1923, 112 pp., 13 figs. Published for use of pilots of aircraft.

Medical Service. Air Medical Service. Air Service Information Circular, vol. 5, no. 414, Apr. 1, 1923, 80 pp., 29 figs. Contains following articles: New Type of Rebreather and other Respiratory Apparatus; Cardio-Vascular Rating as Measure of Physical Fatigue and Efficiency; Dark Adaptation, with Special Reference to Problems of Night Flying; Maddox Rod and Screen Test Combined; Respiratory Volumes of Men During Short Exposures to Constant Low Oxygen Tensions Attained by Rebreathing; Alveolar Air, Respiratory Volume at Low Oxygen Tension; Compensatory Reactions to Low Oxygen; Tests for Determining Sighting Eye; New Apparatus for Testing Accommodation; etc.

B

BALANCING

Rotating Disks. Balancing of Rotating Disk (Unbalancering af roterende Skiver), Th. E. Thomsen. Ingeniören, vol. 32, no. 11, Mar. 17, 1923, pp. 126–127, 4 figs. Describes method and apparatus; application to steam turbines, centrifugal pumps, compressor wheels, etc.

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 136

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co

Castings, Brass
Croll-Reynolds Engineering Co.
Du Pont Engineering Co.
* Edward Valve & Mfg. Co.

Castings, Die-Molded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Heavy
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Iron
Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
Chain Belt Co.
Croll-Reynolds Engineering Co.
* Cole, R. D. Mfg. Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Royersford Fdry. & Mch. Co.
* U. S. Cast Iron Pipe & Fdry Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)
* Edward Valve & Mfg. Co.

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
Chain Belt Co.
* Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Vogt, Henry Machine Co.

Castings, Steel
* Falk Corporation
Link-Belt Co.
Mackintosh-Hemphill Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Div.)

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Iron and Steel
Smooth-On Mfg. Co.

Cement, Refractory
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cement, Pipe Joint
Smooth-On Mfg. Co.

Cement, Water-Resistant
Smooth-On Mfg. Co.

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchy. Corp'n

Chain Belts and Links
Chain Belt Co.
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
Chain Belt Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corp'n

Charging Machines
Whiting Corp'n

Chimneys, Brick (Radial)
* American Chimney Corp'n
Heine Chimney Co.

Chimneys, Concrete
* American Chimney Corp'n
Heine Chimney Co.

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Cloth, Rubber
* Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Clutches, Friction
* Allis-Chalmers Mfg. Co.
Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works
Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Elect. Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* Ashton Valve Co
* Crane Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Chain Belt Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mch. Co.
* Wood's, T. B. Sons Co.

Coloring (Metal)
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Precision Instrument Co. (Inc.)
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.
Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co
* U. S. Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Conduits
* Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.
* Simplex Valve & Meter Co.

Converters, Steel
Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
* Allington & Curtis Mfg. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Conveyors, Ice
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Counters, Revolution
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co Division
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. & Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
* Lunkenheimer Co.

Coupling, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falk Corporation
* Fawcus Machine Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
* Medart Co.
* Nordberg Mfg. Co.
Smith & Serrell

Couplings, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
* Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Cranes, Locomotive
* Brown Hoisting Machinery Co.
Link-Belt Co.
Whiting Corp'n

Cranes, Locomotive (Crawler)
Link-Belt Co.

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works
Whiting Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

BALLISTICS

Interior. Principles of Interior Ballistics (Sur les principes de la Balistique interieure), F. Gossot and R. Liouville. Académie des Sciences—Comptes Rendus des Séances, vol. 176, no. 22, May 28, 1923, pp. 1539–1544. Equations of interior ballistics; calculations based on velocity of combustion of powder being proportional to pressure or below it.

BALLOONS

Barrage. The Value of Barrage Balloons, C. Fontaine. Aviation, vol. 14, no. 26, June 25, 1923, p. 691. Immediate effect is to detour enemy aviators from habitual routes and force them to seek altitude.

BEARING METALS

Thermit. A New Bearing Metal (Ein neues Lagermetall). Wirtschaftsmotor, no. 10, Oct. 1922, p. 6, 1 fig. Discusses thermit, a nickel-hardened white metal of high lead content giving less friction than white metals of high tin content, placed on market by Goldschmidt A. G.; Brinell hardness, 33 per cent; strength of compression, 1000 kg. per sq. cm.

BEARINGS

Lubrication. Lubricating Bearings (Lejesmöring med saedlig omtale af miche), T. C. Thomsen. Ingeniören, vol. 32, no. 16, Apr. 21, 1923, pp. 181–186, 5 figs. Friction and coefficient of friction; lubricating methods; mechanical and force feed; description of Michell bearings.

BEARINGS, ROLLER

Connecting Rods. Kinematics and Dynamics of Roller Bearings in the heads of Connecting Rods (Kinematik und Dynamik der in Pleuelkopfe eingebauten Wälzlager), J. Kirner. Motorwagen, vol. 26, no. 14, May 20, 1923, pp. 213–220, 24 figs. Formulas and calculations; effect of length of connecting rod; velocity of rotation; centrifugal force of pins; etc.

BELT DRIVE

Electric Machinery. Behavior of Belt Drive for Electric Machinery (Remdriftforhold ved elektriske maskiner), Fr. Lund. Elektroteknisk Tidsskrift, vol. 30, no. 9, Mar. 26, 1923, pp. 67–69, 3 figs. Diameter and width of belt pulleys for given speeds; calculations.

Steel Belting. British Practice in Steel Belt Power Transmission, Richard Norris. Indian Industries & Power, vol. 20, no. 7, Mar. 1923, pp. 250–253. Results of tests and experience, and advantages.

BELTING

Dye and Chemical Industry. Transmission Belt Problems in Dye and Chemical Industry, William Staniar. Belting, vol. 22, no. 6, June 1923, pp. 26–28, 6 figs. Tests have shown that no type is actually acidproof; factors to be considered in selection of belting.

BLAST FURNACES

Labor-Saving Equipment. Labor-Saving Blast Furnace Equipment. Iron Age, vol. 111, no. 26, June 28, 1923, pp. 1846–1848, 3 figs. Reduction from 19 to 3 men per shift in stock house of furnace plant; special transfer car required by clearance limitations.

BOILER FEEDWATER

Heating. Effect of Feedwater Heating on Plant Economy, G. G. Bell. Mech. Eng., vol. 45, no. 7, July 1923, pp. 417–420 and 429, 9 figs. Studies of plant equipped with 30,000-kw. units which clearly indicate advantage of bleeding main turbine both in plants with and without economizers.

Softening. Softening Boiler Feed Water by Zeolite System, H. M. Marsh. Can. Mfr., vol. 43, no. 6, June 1923, pp. 21–22, 1 fig. Notes on zeolite system of water softening which will positively prevent formation of scale, sludge and mud in boilers.

BOILER FIRING

Efficiency. Art of Firing (Beitrag zur Heizkunst.) Feuerungstechnik, vol. 11, no. 17, June 1, 1923, pp. 180–182, 2 figs. Air distribution and non-uniformity of coal; good manual stoking gives cheapest steam; value of flame chamber, high ignition temperature, and low end temperature.

Lignite. Lignite for Cement Plants (Rohbraunkohle für Zementfabriken), Berner. Braunkohle, vol. 22, no. 10, June 9, 1923, pp. 145–153, 6 figs. Rearrangement for lignite firing; failure of gas firing in rotary furnaces, especially with lignite dust; effect of lignite ash on cement; latest processes for dust production; lignite pulverizing and drying costs.

[See also PULVERIZED COAL, Boiler Firing With.]

BOILER FURNACES

Draft. Draft (Le tirage), P. Regnault. Outillage, vol. 7, no. 22, June 2, 1923, pp. 630–633, 8 figs. Combustion; natural and forced draft; distribution of air over grate; annual cost data for natural- and mechanical-draft plants.

Fuels, Liquid and Gaseous. Burning of Liquid and Gaseous Fuel, R. C. Powell. Combustion, vol. 9, no. 1, July 1923, pp. 73–80, 5 figs. Report from Nat. Elec. Light Assn. Prime Movers Committee report. Discusses fuel oil situation in 1922, fuel-oil delivery, furnace and burner design for fuel-oil, accessories for mechanical burners for fuel-oil use, measurement of gas supplied in large quantities for boiler firing, combination gas and-oil furnaces, emergency use of fuel oil, and methods of increasing efficiency of oil burning-stations, giving statements, from various companies.

Radiation Type. Radiant Heat from New Type of Furnace. Power, vol. 58, no. 3, July 17, 1923, pp. 99–100, 1 fig. Description of new type of furnace known as Cannon radiating furnace, manufactured by Carborundum Co., Perth Amboy, N. J., in which by far largest part of total heat transfer (depending on particular design of boiler and furnace) is accomplished by pure radiation from outside of combustion chamber; is made in various forms, and for burning gaseous, liquid or powdered fuel; description of experimental oil-burning furnace of this type at Mass. Inst. Technology.

Stoker Equipment. Stoker Equipment and Furnaces, E. B. Ricketts. Combustion, vol. 9, no. 1, July 1923, pp. 31–54, 18 figs. Report relative to combustion from 1923 Nat. Elec. Light Assn. Prime Movers Committee report. Details regarding air heaters, arches, automatic stoker control, high-temperature cements, inclined baffles, lining boiler furnaces with cement gun, stokers, etc., giving statements by different companies.

BOILER OPERATION

Efficiency. Determining Boiler Operating Factors, D. C. Hess. Southern Engr., vol. 39, no. 3, May 1923, pp. 52–55, 8 figs. Discussion of methods used to determine essential factors for economical operation of boiler rooms; results of tests; explains method of calculating combined efficiencies of boiler furnaces and grate.

The Determination of Boiler Efficiency, Henry B. Jones. Power, vol. 58, no. 3, July 17, 1923, pp. 88–91, 1 fig. Scientific analysis of errors that arise in determining boiler efficiency; determining heat in steam; measuring refuse fuels; how to measure pulverized coal; factors determining minimum length of test; computation for length of test; fuel sampling; etc.

BOILER PLATE

Properties. Properties of Boiler Plates at the Higher Temperatures (Eingenschaften von Kesselblechen bei höheren Temperaturen), K. Daeves. Zeit. des Bayerischen Revisions-Vereins, vol. 27, no. 9, May 15, 1923, pp. 65–68, 8 figs. Concludes that plates not cold-worked or hot-rolled or annealed may be used at temperatures of about 300 deg.; material which has been deformed at room temperature or up to 500 deg. should not be used for boiler construction.

BOILERS

Design. Boilers. Sci. & Art of Min., vol. 33, no. 24, June 23, 1923, pp. 376–377, 2 figs. Notes on types of boilers.

Evolution. The Steam Boiler in Evolution, David Brownlie. Elec. Times, vol. 63, no. 1653, June 21, 1923, pp. 644–647. Concise review of steam-generation developments.

Gas Passages, Determination of. Graphic Determination of Gas Passages, M. E. Yeager. Coal Industry, vol. 6, no. 6, June 1923, pp. 297–299, 2 figs. Explanation of chart for reading areas of gas passages in boilers and furnaces; how chart is derived; formulas for circulating areas.

Inspection. Boiler Inspection, R. J. Furr. Southern Engr., vol. 39, no. 3, May 1923, pp. 38–41. How boiler inspector goes about inspecting a boiler and some of the points to be observed.

Marine. See MARINE BOILERS.

Repairing. Repairs to Lap Joint Failures of Water Pockets of Yarrow Boilers, Alec. Broughton. Indus. Australian & Min. Standard, vol. 69, no. 1800, May 31, 1923, pp. 882–884, 6 figs. Description of a typical repair job on Yarrow boilers, with lower drums of elliptical section, fitted in many vessels of H. M. Navy in prewar and early war years; origin of trouble described, and consequent repair job, lies in unsymmetrical shape of water pockets. Abstract of paper read before Instn. Engrs.

Tests. Small Plant Equipped for Extensive Tests to Check Weekly Performance, J. W. Geiger and H. L. Solberg. Power, vol. 58, no. 2, July 10, 1923, pp. 53–55, 3 figs. Tests conducted by Lafayette Box Board and Paper Co., Lafayette, Ind.; economizers and feedwater heaters used in connection with four 3000-sq. ft. 150-lb. boilers; automatic damper control regulates supply of warm air from drying room; one condensing and two 35-lb. back-pressure Corliss engines drive process machinery.

Vertical-Tube. The Ladd-Belleville Vertical-Tube Boiler (La chaudière Ladd-Belleville à tubes verticaux). Vie Technique et Industrielle, vol. 5, no. 44, May 1923, pp. 107–108, 2 figs. Brief description of design and operation.

Waste-Gas-Fired. Boilers Operating under Blast-Furnace and Other Waste Gases, F. Johnstone Taylor. Colliery Guardian, vol. 125, no. 3257, June 1, 1923, p. 1326, 2 figs. Notes on modern systems.

Water-Tube. See BOILERS, WATER-TUBE.

BOILERS, WATER TUBE

Water Circulation. Water Circulation in Vertical Water-Tube Boilers (Der Wasserumlauf in Steilrohrkesseln), W. Otte. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 22, June 2, 1923, pp. 544–547, 13 figs. Points out that design of such boilers, with regard to improvement of water circulation has shown no fundamental progress during past few years; investigation of phenomena in formation of steam bubbles and their movement in boiler feedwater; aspects in design of boiler for obtaining water circulation as nearly perfect as possible.

Yarrow Land-Type. The Yarrow Land Type Boiler. Engineer, vol. 135, no. 3520, June 15, 1923, pp. 638–640, 7 figs. Details of water-tube boiler installed at Dunston Electric Power Station, Newcastle-upon-Tyne; test results; land and marine boilers compared; other designs.

BRICKWORK

Strength of. The Strength of Ordinary Brickwork, Rudolph P. Miller. Eng. & Contracting (Buildings), vol. 59, no. 6, June 27, 1923, pp. 1416–1417, 2 figs. Tests of old brick press from a building. Ordinary brickwork laid in ordinary way by an ordinary bricklayer is said to have just as great strength as brickwork laid specially for testing in a laboratory.

BRASS

Lead in. The Function of Lead in Brass and Bronze, H. Hyman. Metal Industry (Lond.), vol. 22, no. 23, June 8, 1923, pp. 581–582, 1 fig. Reasons for introducing lead into brass; advantages and disadvantages; lead added to bronze to improve its machining properties, and also when it is intended to be used as bearing metal.

BUILDING MATERIALS

Protection of. The Protection of Concrete and Other Building Materials against Water and Noxious Fumes, Maximilian Toch. Indus. & Eng. Chem., vol. 15, no. 7, July 1923, pp. 665–666. Notes on protection of concrete, steel, wood, brick and hollow tile.

BUILDINGS

Fire Protection and Sanitation. Buildings from the Manager's Viewpoint, G. L. H. Arnold. Management & Administration (Management Eng. & Administration), vol. 6, no. 1, July 1923, pp. 43–47, 9 figs. Practical suggestions on fire protection, sanitation, and service equipment.

Mechanical Plant. Mechanical Plant of John Hancock Building, Charles L. Hubbard. Power Plant Eng., vol. 27, no. 13, July 1, 1923, pp. 659–664, 9 figs. Plant of new Boston office building to meet diversified service requirements, including special systems of heating, ventilating and air-conditioning apparatus, elevators, refrigerating machinery, domestic-hot-water and drinking-water service, sanitary equipment and special automatic drainage systems extending below sewage system, electrical equipment, pneumatic conveyors, etc.

Moving. Simple Methods of Trussing and Bracing Extra Wide Buildings for Moving, E. W. LaPlant. Bldg. Age, vol. 45, no. 6, June 1923, pp. 70–72, 4 figs. Practical details to be employed in connection with three-point method of loading.

BUSES

Street Space Occupied by. Street Space Occupied by Cars and Buses, Daniel L. Turner. Elec. Ry. Jl., vol. 61, no. 22, June 2, 1923, pp. 957–958. Comparison of various types of single-deck and double-deck street cars and buses in New York and Great Britain; on a seat basis double-deck designs show up well, but for American conditions cars do not compare unfavorably.

Trolley. Trackless Trolley on the Increase. Elec. Traction, vol. 19, no. 6, June 1923, pp. 288–289, 2 figs. Successful operation in several cities proves that the trackless trolley has a real place in modern transportation.

C

CABLES, HOISTING

Construction. Hoisting Apparatus (Les Appareils de Levage et de Manutention à bras), Marcel Demouy. Métallurgie, vol. 55, no. 22, May 31, 1923, pp. 785–789, 13 figs. Construction and manufacture of metal cables; nature of metals; etc.

Elevator. Hoisting-Rope Compensation on Elevators, A. A. Gazda. Power, vol. 58, no. 2, July 10, 1923, pp. 58–60, 8 figs. Compares the various arrangements of compensating cables and shows their relative advantages.

CALORIMETERS

Junkers. The Junkers Calorimeter. Gas Jl., vol. 162, no. 3136, June 20, 1923, p. 726, 1 fig. Flow calorimeter designed for testing gases and liquids.

CAR LIGHTING

Electric. Car Lighting on the Canadian National Railways, A. H. Matthews. Ry. Elec. Engr., vol. 14, no. 6, June 1923, pp. 171–173, 9 figs. Difficulties encountered in winter-time maintenance of electrically lighted cars in Quebec.

CAR WHEELS

Manufacture. The Manufacture of Railway Wheels. Machy. (Lond.), vol. 22, no. 559, June 14, 1923, pp. 325–330, 10 figs. Methods employed in manufacture of built-up wheel centers in forge and machine shops of Wm. Beardmore & Co., Ltd., Parkhead, Glasgow.

CARBURETORS

Test Chamber for Aircraft. Description of Carburetor Test Chamber and Method of Making Computations, J. M. Miller. Air Service Information Circular, vol. 5, no. 405, Apr. 1, 1923, 16 pp., 11 figs. Designed and built by Engineering Divison of Air Service to determine metering characteristics—mixture ratio and fuel flow—of aviation-engine carburetors under various conditions of temperature, air flow, throttle opening, and altitude; description of apparatus and computation of test results.

CARS

Development. Railroad Cars, Their Origin and Development, E. F. Carry. Ry. Age, vol. 74, no. 29, June 23, 1923, pp. 1581–1586, 5 figs. What growth in capacity has meant to civilization, and factors making it possible.

Painting. Time of Painting a Car Cut in Half, J. A. Lucas. Elec. Ry. Jl., vol. 62, no. 1, July 7, 1923, pp.

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 136

Cranes, Portable
* Brown Hoisting Machinery Co
Clyde Iron Works Sales Co.
Link-Belt Co.

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Ore and Rock
* Nordberg Mfg. Co.

Crushers, Roll
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Cupolas
* Bigelow Co.
Northern Engineering Works
Whiting Corp'n

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
* Whitney Mfg. Co.

Cylinders Rebored
* Hooven, Owens, Rentschler Co.

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Diaphragms, Rubber
United States Rubber Co.

Die Castings
(See Castings, Die Molded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Thread Cutting
Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Drafting Room Furniture
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Drawing Instruments and Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Lidgerwood Mfg. Co.
* Morris Machine Works

Dredging Sleeve
United States Rubber Co.

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mch. Co.

Drills, Coal and Slate
* General Electric Co.
* Ingersoll-Rand Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
* Johns-Manville (Inc.)
Manufacturing Equip. & Engrg. Co.

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.
Link-Belt Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Philadelphia Drying Machy. Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
Clarage Fan Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.

Dyeing Machinery
Philadelphia Drying Machy. Co.

Dynamometers
* General Electric Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.

Ejectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Electrical Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Electrical Supplies
* General Electric Co.
* Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Elevators, Electric
Northern Engineering Works

Elevators, Hydraulic
Whiting Corp'n

Elevators, Passenger and Freight
Northern Engineering Works

Elevators, Pneumatic
Whiting Corp'n

Elevators, Portable
Link-Belt Co.

Elevators, Telescopic
Link-Belt Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
* Nordberg Mfg. Co.

Engine Stops
* Schutte & Koerting Co.

Engines, Blowing
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Westinghouse Electric & Mfg. Co.

Engines, Gasoline
Midwest Engine Corp'n
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
Clyde Iron Works Sales Co.
* Hooven, Owens, Rentschler Co.
* Lidgerwood Mfg. Co.
* Morris Machine Works
* Nordberg Mfg. Co.

Engines, Kerosene
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
* Nordberg Mfg. Co.
Sterling Engine Co.
* Ward, Chas. Engineering Wks.
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.

Engines, Marine, Steam
* Nordberg Mfg. Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
Otto Engine Works
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Nordberg Mfg. Co.
Sterling Engine Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
* Titusville Iron Works Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Leffel, James & Co.
* Troy Engine & Machine Co.
* Westinghouse Electric & Mfg. Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
Harrisburg Fdry. & Mach. Wks.
* Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engine, Steam, High Speed
* American Blower Co.
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engines, Steam, Throttling
* Brownell Co.
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
Stumpf Una-Flow Engine Co. (Inc.)

Engines, Steam, Variable Speed
* Brownell Co.
Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Exhaust Heads
Hoppes Mfg. Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
Clarage Fan Co.

Exhausters, Gas
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.

Extractors, Centrifugal
Tolhurst Machine Works

Extractors, Oil and Grease
* Kieley & Mueller (Inc.)
* Schaeffer & Budenberg Mfg. Co and American Steam Gauge & Valve Mfg. Co. Division

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Machy. Co

Feeders, Pulverized Fuel
Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Filters, Air
Midwest Steel & Supply Co. (Inc.)

Filters, Gravity
* Permutit Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Graver Corp'n
* Permutit Co.

Filters, Water
Elliott Co.
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)
* Lunkenheimer Co.

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Division)
* U. S. Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

Fittings, Steel
* Crane Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Division)
* Vogt, Henry Machine Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

3-6, 7 figs. Pneumatic spray painting system, introduced at Cold Springs Shops, Milwaukee, proves effective and economical.

Street-Railway, Storage of. Inclosed Storage Favored from Standpoint of Service Reliability. Elec. Ry. Jl., vol. 61, no. 24, June 16, 1923, pp. 993-996, 1 fig. Survey of experience and opinion, comparing open and closed street-railway car storage.

CARS, FREIGHT.

Steel-Frame Box. A New Steel Frame Double-Sheathed Box Car. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 1010-1015, 5 figs. 3000-steel frame 40 ton double-sheathed box cars under construction for Santa Fe Ry.

Pullman. New Pullman Cars for L. M. S. Caledonian Section. Ry. Gaz., vol. 38, no. 26, June 29, 1923, pp. 960-964, 10 figs. Details of three first-class dining cars and one third-class buffet car built for Caledonian section of Lond., Midland & Scottish Ry.

CARS, REFRIGERATOR

Design. A Notable Development in Refrigerator Car Design. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 1015-1032, 30 figs. New C. M. & St. P. Ry. experimental refrigerator car represents original analysis of refrigeration and structural problems; refrigeration problems involved in design; structural features.

CARS, TANK

Inspection. The Inspector and Tank Cars, Thomas O'Donnell. Car Foremen's Assn. of Chicago—Proc. vol. 17, no. 8, May 1923, pp. 24-39 and (discussion) 39-60. Procedure to be followed in inspecting tank cars. Presented before Car Foremen's Assn. of Chicago.

CAST IRON

Pearlitic. Pearlitic Cast-Iron: Its Production, Mechanical Properties and Possibilities, H. Bauer. Foundry Trade Jl., vol. 27, no. 355, June 7, 1923, pp. 454-456, 6 figs. Results of tests; possible uses. Translated from Stahl u. Eisen.

CENTRAL STATIONS

Auxiliary Drives. Electric Drive for Station Auxiliaries, M. D. Engle. Elec. Light & Power, vol. 1, no. 6, June 1923, pp. 92-95 and 107, 3 figs. Combinations of steam-driven and motor-driven auxiliaries best suited to plants under 1000 kw., from 1000 to 5000 kw., and larger than 5000 kw.

Electrical Equipment. Desirable Duplication and Safeguarding in the Electrical Equipment of a Generating Station, William F. Sims. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 7, July 1923, pp. 704-705. Discusses more important considerations to be taken into account and points out that local conditions will have determining influence on decision made.

Off-Peak Load for Truck Storage Batteries. Opportunities for the Central Station in Electric Vehicles, A. M. Frost and H. E. Sandoval. Jl. Electricity & West. Ind., vol. 50, no. 11, June 1, 1923, pp. 420-425, 6 figs. Comparative costs of electric and gas trucks; advantages of electric trucks for short hauls.

Short Circuits in. Short Circuits in Central Stations and How to Remedy Them (Phénomènes de court-circuit dans les stations centrales et moyens d'y remédier), A.-R. Garnier. Industrie Electrique, vol. 32, no. 742, May 25, 1923, pp. 186-189, 3 figs. Discusses effect of short circuits on generators and proposes checking coils as most simple and effective remedy.

COAL

Carbonization. A Study of Some Physical Laws Governing the Carbonization of Coal, A. W. Warner. Am. Gas Assn. Monthly, vol. 5, no. 7, July, 1923, 431-441, 2 figs. Experiments from which five basic laws governing carbonization were deduced.

Low Temperature Carbonization, J. Taylor. Am. Gas Jl., vol. 118, no. 26, June 30, 1923, pp. 561-564, 4 figs. Construction of retorts and settings; details of operation in British gas works; properties of coalite produced.

Classification. The Classification of Coals, T. J. Drakeley. Fuel in Sci. & Practice, vol. 2, no. 6, July 1923, pp. 195-200, 4 figs. Review of different systems of classifying coal; analysis of coal.

Coking Test. A New Apparatus for the Coking Test of Coal, R. Lessing. Fuel in Sci. & Practice, vol. 2, nos. 5 and 6, June and July 1923, pp. 152-156 and 186-190, 7 figs. Descriptions of author's method, showing how it has been developed; present form of apparatus and method of operation.

Fuel Value. Coal and Its Value as Fuel (Die Steinkohlen und ihr feuerungstechnischer Wert), F. Starke. Feuerungstechnik, vol. 11, no. 16, May 15, 1923, pp. 169-171, 2 figs. Classification of coal by occurrence; heating value of coals; temperature of combustion; fuel economics.

Spontaneous Combustion. Spontaneous Combustion of Coal (Träkols självantändning), Hilding Bergström. Jernkontorets Annaler, vol. 107, no. 2, 1923, pp. 39-45, 4 figs. Heating of coal pile; temperature determination and remedial measures.

Volatiles in, Determination of. Determining Volatiles in Coal and Anthracite (De bepaling van vluchtige stoffen in steenkool en anthraciet en de omrekening hiervan op droge stof en koolsubstantie), D. J. W. Kreulen. Chemisch Weekblad, vol. 20, no. 17, Apr. 28, 1923, pp. 225-229, 2 figs. Discusses Bochumer method, and results of experiments, including tables of volatiles from original coal substance and dry substance.

COAL HANDLING

Pneumatic. The Pneumatic Handling of Coal. Indus. Management (Lond.), vol. 9, nos. 12 and 13, June 14 and 28, pp. 371-373 and 403-405, 5 figs. Points out failures that have occurred are not due to faulty principle, but rather to its faulty application through imperfect knowledge or lack of experience. Describes pneumatic plant at North Metropolitan power station, Brimsdown.

COAL STORAGE

Detroit Water Works. Coal Storage for Year's Supply for Detroit Water-Works. Eng. News-Rec., vol. 91, no. 1, July 5, 1923, pp. 10-11, 2 figs. Duplicate coal-handling equipment gives continuity of service; dragline scrapers reclaim coal to feed hoppers.

COAL TIPPLES

Design. Well Designed Tipple in the Pocahontas Field (W. Va.), Merrill Hibbard. Coal Industry, vol. 6, no. 6, June 1923, pp. 280-282, 4 figs. Provision made for loading any combination of sizes on four tracks; special precaution necessary to handle friable coal from this field.

COINS

Minting. The Royal Mint, 1873-1923 (Den kongelige Mønt i Holbergsgade 1873-1923), H. C. Nielsen. Teknisk Tidsskrift (Tekniske Forenings), vol. 47, no. 11, May 24, 1923, pp. 103-114, 7 figs. Describes buildings, mines and output of mint during the 150 years; composition of coins of various countries.

COKE

Bituminous-Coal. A Method of Making Non-Fingery Coke from Bituminous Coals High in Volatile Matter, Kotaro Shimomura. Chem. & Industry, vol. 42, no. 23, June 8, 1923, pp. 556-558, 4 figs. Method developed by author with object of making coke manufacturer independent of anthracites or coals of low volatile matter, in production of non-fingery coke.

Blast-Furnace. Combustility of Blast Furnace Coke, Ralph A. Sherman and S. P. Kinney. Iron Age, vol. 111, no. 26, June 28, 1923, pp. 1839-1844, 6 figs. Depends mainly on size of pieces of coke; its relation to operation of furnace; discussion of re-oxidation theory and theory of concentration of heat. Paper read before Eastern States Blast Furnace & Coke Oven Assn.

Combustibility. The Combustibility of Coke, Ralph A. Sherman. Fuels & Furnaces, vol. 1, no. 2, June 1923, pp. 97-100. Describes experiments conducted by U. S. Bur. Mines. It was found that differences in blast-furnace and foundry operation cannot be attributed to differences in relative combustibilities of cokes.

Gas, Use as Fuel. Gas Coke as a Fuel (Le coke de gaz, combustible industriel), H. Decluy. Chaleur et Industrie, vol. 4, no. 37, May 1923, pp. 442-448. Composition and properties, production and applications of gas coke; steam production with gas coke.

Recovery from Ashes. Recovery of Fuel From Ashes (Rückgewinnung von Brennstoffen aus Feuerungsrückständen), Rauch u. Staub, vol. 13, no. 1-2, May 1923, pp. 2-3. Discusses dry and wet processes for separating coke, and combination of magnetic separator with wet process as most effective.

COKE HANDLING

Avoidance of Small Sizes. The Care of Coke (Koksschonung), Binder. Gas- u. Wasserfach, vol. 66, no. 22, June 2, 1923, pp. 313-316, 3 figs. Describes operations of a gas works working two shifts in 24 hours; coke production and small coke; recommendations for plant and operations to avoid small coke as far as possible.

Mechanical. Mechanical Handling of Coke at the Perrache Plant of the Lyon Gas Company (La manutention méchanique du coke à l'usine de Perrache, de la Compagnie du Gaz de Lyon), Ch. Dantin. Génie Civil, vol. 82, no. 23, June 9, 1923, pp. 541-543, 9 figs. partly on supp. plate. Description of new automatic plant; capacity 180,000 tons per year at 0.75 francs per ton; overhead monorail conveying.

COKE MANUFACTURE

Ammonia Yield, Increasing. Possibilities of Increasing Ammonia Yields in Coke Oven Practice, R. A. Mott. Gas World, vol. 78, no. 2015, Mar. 3, 1923, pp. 12-17 (includes discussion), 5 figs. Nitrogen content of coal and ammonia yield; coking temperatures and distribution of nitrogen; dissociation of ammonia; recovering nitrogen in coke; preservation of ammonia; various atmospheres employed; effect of contact materials; increased water vapor; influence of old walls; part played by water in oven; rate of gas evolution; steaming ovens and coke gasification; difficulties of steaming process. Paper read before Coke Oven Mgrs.' Assn.

By-Product. Coke and By-Products in 1921, R. S. McBride. U. S. Geol. Survey, II:33, June 14, 1923, pp. 371-444, 11 figs. Production, disposal, and by-products of coke. Covers beehive and by-product coke but not coke produced in gas plants.

Modern Practice. A Few Notes on Modern Tendencies in Coking Practice, C. E. Wallin. Can. Inst. Min. & Met.—Bul., no. 135, July 1923, pp. 447-450 and (discussion) 450-452. Factors entering into coking development. Paper before Min. Soc. of Nova Scotia.

COKE OVENS

By-Products. The Modern By-Product Coke Oven and Its Application, C. J. Ramsburg. Central Ry. Club—Official Proc., vol. 31, no. 3, May 1923, 1374-1376. Review of development.

CONDENSERS, STEAM

Surface. An Improved Form of Surface Condenser, Luther D. Lovekin. Pac. Mar. Rev., vol. 20, no. 7, July 1923, pp. 353-354, 1 fig. Design and advantages of Lovekin condenser.

Interpretation of Surface-Condenser Readings, B. C. Sprague. Power, vol. 58, no. 2, July 10, 1923, pp. 47-49, 1 fig. Determination of condition of tube surfaces from condenser readings; readings obtainable and significance; important factors affecting heat transfer.

Tubes. Condenser Tubes, C. Blazey. Commonwealth Engr., vol. 10, no. 8, Mar. 1, 1923, pp. 285-287, 3 figs. Corrosion and protection of condenser tubes; grain size and crystal structure.

CONVEYORS

Belt, for Clay Handling. Handling Clay with Belt Conveyors. Brick & Clay Rec., vol. 63, no. 13, June 26, 1923, pp. 1136-1137, 1 fig. Simple design, comparatively low cost, and requires little power to drive it. Factors to be considered in deciding upon conveyor for clay.

Steel Belt. Flexible Steel Belts for Sugar Conveyors, N. B. Wilkes. La. Planter & Sugar Mfr., vol. 70, no. 22, June 2, 1923, pp. 478-480, 13 figs. Consists of a solid, perfectly straight and smooth hardened and tempered steel strip, cold rolled from a high grade of Swedish steel.

Workshop. Using Workshop Conveyors to Reduce Costs, M. J. Anderson. Can. Machy., vol. 29, no. 26, June 28, 1923, pp. 15-17 and 35, 1 fig. Describes rearrangement and improvement of systems which made it possible to attain much larger output without additional floor space.

COOLING TOWERS

Design. Cooling Towers and Ponds, Charles L. Hubbard. Southern Engr., vol. 39, no. 4, June 1923, pp. 50-54, 9 figs. Design and construction of cooling towers, use of cooling ponds, and data and computations.

CORES

Block. Block Cores, James Edgar. Metal Industry (Lond.), vol. 22, no. 23, June 8, 1923, pp. 583-584, 6 figs. Slab or block core is defined for practical purposes as core which is used for recesses on outside of casting and is much less in thickness than in length or width.

COST ACCOUNTING

Chemical Works. Methods of Costing in Chemical Works, F. M. Potter. Chem. Age (Lond.), vol. 8, nos. 207 and 208, June 2 and 9, 1923, pp. 588-589 and 612-615, 3 figs. Correct use of cost returns; gaseous losses; continuous improvement; maintenance of balance; mechanical handling and fuel costs; plant maintenance; faulty conditions; accident and sickness costs.

Labor. Keeping Time and Pay Records, Carbis A. Walker. Iron Trade Rev., vol. 73, no. 1, July 5, 1923, pp. 38-41, 10 figs. Forms for compiling reports in iron and steel plants, and system that has proved efficient.

COSTS

Production. The Three Points of Attack on Production Costs, C. C. Hermann. Indus. Management (N. Y.), vol. 66, no. 1, July 1923, pp. 53-58, 5 figs. Analyzing the product, the plant, and the interrelationship of operations.

CRANES

Electric Equipment. Electric Equipment of Cranes and Hoisting and Conveying Apparatus in the Late Decade (Einiges über die Entwicklung der elektrischen Ausrüstungen von Kranen, Aufzugen und Transportanlagen im letzten Dezennium), Ernst Schwarz. Elektrotechnik u. Maschinenbau, vol. 41, no. 23, June 10, 1923, pp. 341-346, 8 figs. Calculation of motors for cranes, a. c. and d. c.; control and switching devices; safety devices; starting and regulating resistance; electromagnets; etc.

CUPOLAS

Design. The Foundry Cupola. Metal Industry (Lond.), vol. 22, no. 23, June 8, 1923, pp. 593-594. Discussion of most favorable conditions of cupola design.

Linings. Cupola Linings, Walter J. May. Mech. World, vol. 73, no. 1900, June 1, 1923, p. 345. Features upon which life of cupola lining depends.

CUTTING TOOLS

Grinding and Setting. Grinding and Setting of Metal Cutting Tools, J. H. Rodgers. Can. Machy., vol. 29, nos. 19 and 23, May 10 and June 7, 1923, pp. 14-17, 28 and 35, 13 figs. Effect of rake and clearance on efficiency of tool; overhang should be kept as short as possible; boring and threading holes; etc.; gives tool-grinding chart.

D

DIE CASTING

Two-Operation. Die-castings Requiring Two Operations, Charles Pack. Machy. (N. Y.), vol. 29, no. 11, July 1923, pp. 869-872, 4 figs. Examples of such casting operations.

DIESEL ENGINES

Design. Elements of Diesel Engine Design, David Bruce. Oil Engine Power, vol. 1, nos. 1, 3, 4, 5 and 7, Jan., Mar., Apr., May and July 1923, pp. 27-28, 142-144, 184-187, 249-252 and 351-354, 20 figs. Brief description of engine, its underlying principles

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 136

Flanges
* American Spiral Pipe Works
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
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* Vogt, Henry Machine Co.

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

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United States Rubber Co.

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* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Co.
* Nordberg Mfg. Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Furnace & Burner Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Foundry Equipment
Northern Engineering Works
Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnaces, Annealing and Tempering
* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Whiting Corp'n

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Detroit Electric Furnace Co.
Kenworthy, Chas F. (Inc.)

Furnaces, Forging
Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
Kenworthy, Chas F. (Inc.)

Furnaces, Heat Treating
* Best, W. N Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Furnace & Burner Corp'n
Detroit Electric Furnace Co.
* General Electric Co.
Whiting Corp'n

Furnaces, Non-Ferrous
Detroit Electric Furnace Co.

Furnaces, Non-Oxidizing
Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
* Best, W. N. Furnace & Burner Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Green Engineering Co.
Herbert Boiler Co.
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
* Johns-Manville (Inc.)

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* Crosby Steam Gage & Valve Co.
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* Ashton Valve Co.
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* Crosby Steam Gage & Valve Co.
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Bacharach Industrial Instrument Co.
* Bailey Meter Co.
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* Simplex Valve & Meter Co.

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* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
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* Uehling Instrument Co.

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* Precision Instrument Co.
* Simplex Valve & Meter Co.

Gages, Vacuum
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
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* Ashton Valve Co.
* Bristol Co.
* Crane Co.
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* Lunkenheimer Co.
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* Simplex Valve & Meter Co.

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Improved Equipment Co.

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* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co
* Jenkins Bros.
* Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Iron, Corrugated
Smooth-On Mfg. Co.

Gaskets, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Gasoline
Texas Co.

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mch. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mch. Co.

Gears, Cut
Brown, A. & F. Co.
Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Philadelphia Gear Works
* Poole Engrg. & Mch. Co.

Gears, Fibre
* General Electric Co
* James, D. O. Mfg. Co.

Gears, Herringbone
* Falk Corporation

Gears, Machine Molded
Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.
Philadelphia Gear Works

Gears, Speed Reduction
Chain Belt Co.
* De Laval Steam Turbine Co.
* Falk Corporation
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
* Kerr Turbine Co.
Link-Belt Co.
* Poole Engrg. & Mach. Co.
* Westinghouse Electric & Mfg. Co.

Gears, Worm
Chain Belt Co.
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Westinghouse Electric & Mfg. Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Nordberg Mfg. Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Governors, Engine, Oil
* Nordberg Mfg. Co.

Governors, Engine, Steam
* Nordberg Mfg. Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Kieley & Mueller (Inc.)

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Grinding Machinery
Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Guards (Electric Lamp)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Franklin Machine Co.
Long & Allstatter Co

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hangers, Shaft
Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball Bearing)
* Hyatt Roller Bearing Co.
* S K F Industries (Inc.)

Hangers, Shaft (Roller Bearing)
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United States Rubber Co.

Hardening
* American Metal Treatment Co.

Heat Exchangers
Croll-Reynolds Engineering Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
Croll-Reynolds Engineering Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

and the various ways in which these may be applied; the various formulas and practices adopted in drawing office; problems of balance and of twisting and bending moments in crankshafts; flywheel calculations, cylinders, pistons and bearing pressures; scavenge systems; valve timing. Paper read before Assn. Eng., Shipbldg. & Draftsman.

Indicator Cards. Interpretation of Diesel Engine Cards. H. F. Birnie. Power Plant Eng., vol. 27, no. 13, July 1, 1923, pp. 674–677, 15 figs. Cards taken on 4-cycle full Diesel engine show how operating conditions may be checked.

Marine. 1600-Hp. Four-Stroke Marine Diesel Engine (En 1600 HK e Firetakts-Skibsdieselmotor), T. Gregersen. Teknisk Ukeblad, vol. 70, nos. 8 and 9, Feb. 23 and Mar. 2, 1923, pp. 75–77 and 87–89, 14 figs. Details of engine for 9000-ton freighter building at Bremen; 16 hp. at 100 r.p.m.; 6 cycles; results of trial run and tests.

Power-Plant. Types of Modern Power Plant Oil Engines. Oil Engine Power, vol. 1, no. 7, July 1923, pp. 340–344 and 349–350, 10 figs. Describes Worthington crosshead-type vertical two-cycle engine having airless injection system combined with a precombustion chamber; has scavenge pumps at lower end of cylinders and incorporates balancing principles so successfully used in high-speed steam-engine power.

Water-Works Practice. The Diesel Oil Engine for Water Works Service; Charles E. Lucke. Also Direct Connection of Diesel Engines and Displacement Pumps, Rodney D. Hall; Displacement Pumps Gear Driven by Diesel Engines at Reduced R.P.M., H. M. Chase; Centrifugal Pumps for Diesel Engine Drive, Max Spillmann; and Water Works Equipment Steam vs. Oil Engine, Rodney M. Hall. New England Water Works Assn.—Jl., vol. 37, no. 2, June 1923, pp. 145–183 and (discussion) 183–189, 23 figs. Development of Diesel engines for waterworks service and its application to the different phases of the practice.

DRILLING MACHINES

Adjustable-Head Gang. Adjustable Head Gang Drilling Machine. Machy. (Lond.), vol. 22, no. 559, June 14, 1923, pp. 341–342, 3 figs. Four-spindle machine for operating on automobile front axles and work of light character that has a number of holes of roughly same diameter to be drilled.

DROP FORGING

Equipment. Modern Drop Forging Equipment, Bernard Brett. Practical Engr., vol. 67, nos. 1892 and 1893, May 31 and June 7, 1923, pp. 303–305 and 314–316, 11 figs. Equipment for drop hammers; describes lifter or appliance controlling tup, furnaces for providing drive, clipping press, and dies.

DURALUMIN

Heat Treatment. Investigation of the Heat Treatment of Sand-Cast Duralumin, Samuel Daniels. Air Service Information Circular, vol. 5, no. 408, Apr. 1, 1923, 13 pp., 6 figs. Investigation to determine effect of chemical composition and heat treatment upon physical properties of sand-cast duralumin, and to develop a duralumin which, upon treatment, will possess certain given properties.

DUST

Industrial, Removal of. Dangers of Industrial Dusts and Fumes, C. E. A. Winslow. Forging & Heat Treating, vol. 9, no. 6, June 1923, pp. 271–272. Atmospheric, metallic or mineral dusts constitute a serious menace to health; wet grinding or special dust-removal systems advocated to reduce this danger.

E

EDUCATION, ENGINEERING

Coöperative. Ten Years of Cooperative Education, Herbert D. Casey. Machy. (N. Y.), vol. 29, no. 11, July 1923, pp. 861–862, 2 figs. Coöperative course organized as department of public schools in Springfield, Vt.

Laboratory Instruction. Laboratory Instruction in Engineering, Roy Kegerreis. Eng. Education, vol. 13, no. 10, June 1923, pp. 620–625. Suggestive problems; term laboratory work is used broadly to include all processes of working out problems by trial, observation, experiment, and similar methods.

Promotion of. Developing Engineering Education, H. C. Woods. Eng. Education, vol. 13, no. 10, June 1923, pp. 629–629. Suggestions for promotion of engineering education.

Student Enrollment in Universities. Fluctuations in Student Enrollment in Engineering Courses in American Universities and Colleges, Alan Bright and W. F. Rittman. Eng. Education, vol. 13, no. 10, June 1923, pp. 632–642, 9 figs. Data furnished by the typical American universities and colleges show trends in interest in engineering education during past 10 years. See also (abstract) in Mech. Eng., vol. 45, no. 7, July 1923, p. 449, 2 figs.

ELECTRIC FURNACES

Fiat. F. I. A. T. Electric Furnace (Le Four électrique "F. I. A. T."), G. Cougn. Fonderie Moderne, vol. 17, June 1923, pp. 193–200, 10 figs. Details of design and construction; rotary movement of furnace; electrodes and their management; uses three-phase current at 21,000 volts stepped down to 130 and 75 volts; pouring process; electric losses; etc.

Greaves-Etchells. Greaves-Etchells System of Electric Furnaces, Frank Hodson. Fuels & Furnaces, vol. 1, nos. 1 and 2, May and June 1923, pp. 21–24 and 107–108, 1 fig. Eight-electrode furnace which has three times transformer capacity of next largest steel furnace; furnace linings; flexibility of operation.

Induction. High-Frequency Induction Furnaces (Högfrekvens-induktionsugnen), J. Härdén. Teknisk Tidskrift, vol. 53, no. 5, Feb. 3, 1923, pp. (Elektroteknik 2 Section) 18–21, 6 figs. Arrangement of furnace, primaries, spark gaps, crucibles, thermal efficiency of boilers, etc.

Induction Furnace for Non-Ferrous Metals (Four à induction pour métaux non ferreux), Emile Demenge. Société des Ingénieurs Civils de France—Procès-Verbal, no. 10, May 11, 1923, pp. 362–366. Its advantages; absence of electrodes and their control; describes an experimental furnace of 80 kw. giving entire satisfaction.

Progress in the Field of High-Frequency Induction Heating (Fortschritte auf dem Gebiete der Hochfrequenz-Induktionsheizung), E. Fr. Russ. Elektrotechnische Zeit., vol. 44, no. 21, May 24, 1923, pp. 481–484, 9 figs. Development of and experiences with high-frequency electric furnaces during past two years; improvements in high-frequency generators; deals with smelting, high-temperature and vacuum, crucible, mint, heat-treating, and other furnaces.

Iron-Melting. Electric Furnaces for the Production of Cast Iron in its Present Development (Der Elektroofen zur Erzeugung von Gusseisen in seiner heutigen Entwicklung), Wintermeyer. Elektrotechnischer Anzeiger, vol. 40, no. 40, no. 88, June 2, 1923, pp. 612–614. Electric blast furnace and its application in production of synthetic cast iron; advantages of new furnace.

Non-Ferrous. Electric Melting of Non-Ferrous Alloys, H. W. Gillett. Fuels & Furnaces, vol. 1, nos. 1 and 2, May and June, 1923, pp. 9–12 and 84–88, 7 figs. May: Present progress; three types of electric brass furnaces; description of granular resistor type. June: Description of electric-arc type and the induction furnace.

Refractories for. Requirements of Refractories for Electric Furnaces, Clyde E. Williams. Am. Ceramic Soc.—Jl., vol. 6, no. 6, June 1923, pp. 753–760. Discussion of problems existing in important electric-furnace processes; specific conditions and refractory requirements in steel, iron, and non-ferrous metal melting, smelting furnaces for producing iron, ferroalloys and calcium carbide, and in furnaces for melting refractory materials.

Resistance. Bario Electric Furnace Installation, F. J. Ryan. Fuels & Furnaces, vol. 1, no. 1, May, 1923, pp. 39–40. Describes small resistance-type electric melting furnace installed at plant of Bario Metal Corpn.

Steel. Electric Furnaces for Heat Treatment of Steel. A. W. Lamont. Fuels & Furnaces, vol. 1, no. 2, June 1923, pp. 101–106, 7 figs. Description of carbottom furnace for reconditioning locomotive side rods at Transcona Shops of Can. Nat. Rys.

Vacuum. Vacuum Furnaces (Les fours à decharge dans le vide), L. Bosano. Nature (Paris), no. 2566, June 9, 1923, pp. 365–366, 6 figs. Describes various types of cathode furnaces; work of Parsons and Campbell; notes on Tiede, Wartenberg, Fischer, and other furnaces.

ELECTRIC LOCOMOTIVES

A.C.-D.C. New 180-Ton A.C. or D.C. Locomotive of the New York, New Haven and Hartford Railway (Nouvelle locomotive électrique de 180 tonnes à courant continu ou alternatif, du New-York, New-Haven and Hartford Railway). Génie Civil, vol. 82, no. 24, June 16, 1923, pp. 565–569, 6 figs. A.c. double-feed arrangement of 11,000 volts and d.c. of 150,000 volts; details of design; characteristics of American and English locomotives.

Narrow-Gage D.C. Narrow Gauge D.C. Electric Locomotives for Japan, P. L. Mardis. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 1043–1045, 5 figs. Regenerative braking and multiple-unit operation provided in direct-current design developing 1200 hp. and 30,250 lb. tractive effort.

Swiss. Single-Phase Locomotives with Single-Axle Drive, Type 1-C-1, for the Swiss Federal Railway (Einphasen-Lokomotiven mit Einzelachsantrieb, Typ 1-C-1, der Ateliers de Sécheron; Genf, fur die S.B.B.), J. Werz. Schweizerische Bauzeitung, vol. 81, no. 22, June 2, 1923, pp. 270–275, 10 figs. Describes locomotives built by Sécherons Works, Geneva, which are said to show considerable improvement with regard to total weight and initial cost over those heretofore ordered for same purpose.

ELECTRIC PLANTS

Diesel-Engine. A 1,500 Hp. Diesel Engine Electric Plant. Southern Engr., vol. 39, no. 3, May 1923, pp. 35–38, 6 figs. Details of Diesel engine installation of Citizens Light & Power Co., New Orleans, La.

Protection. Differential System for Protecting Three-Phase Plants (Et Differentialsystem til Beskyttelse af Trefaseanlaeg), R. Johns. Jensen. Teknisk Tidsskrift (Elektroteknikeren), vol. 19, no. 2, Jan. 24, 1923, pp. 9–13, 16 figs. Protection of machinery, transformers, and feeder cables to substations by relays of Merz & Price system, at new Orsted central station in Copenhagen.

ELECTRIC RAILWAYS

Contact Wires, Bronze. Erie Replaces Steel Contact Wire With Bronze. Ry. Age, vol. 74, no. 30, June 30, 1923, pp. 1693–1696, 11 figs. New contact wire is being strung on electrified section of railroad extending from Rochester to Mt. Morris, N. Y., distance of 34 mi.

Iowa. The Electric Railways of Iowa. Elec. Traction, vol. 19, no. 6, June 1923, pp. 278–285, 6 figs. Statistics about electric railways in Iowa, which number 28 and have approximately 1100 miles of track.

Motors. The 3-Phase Induction Motor in Relation to the D.C. Motor with Separate Excitation (Die Drehstrom-Induktrionsmaschine als erweiterter Sonderfall der Gleichstrommaschine mit Fremderregung), W. Kummer. Schweizerische Bauzeitung, vol. 81, no. 23, June 9, 1923, pp. 281–283, 5 figs. Calculations supplementary to author's work entitled, Operating Curves and Safety of Different Methods of Regenerative Braking in Electric Railways, published in same journal, vol. 77, Mar. 26 and Apr. 2, 1921. (See reference in Eng. Index, 1921, p. 188).

EMERY

Deposits, Turkey. Bituminous Emery of Ismid in Asia Minor (Die Bituminenmergel von Ismid in Kleinasien), F. Hansgirg and B. Sander. Petroleum, vol. 19, no. 17, June 10, 1923, pp. 576–585, 6 figs. Geology, position of mineral and conditions under which it must be mined for mining; estimated deposits; examination and distillation of samples of shale; proposals for practical mining work.

EMPLOYEES' REPRESENTATION

Copper Queen Mine. A Metal Mine Employees' Representation Plan, H. C. Henrie. Min. Congress Jl., vol. 9, no. 6, June 1923, pp. 195–198. Copper Queen Mine is a center of mutual confidence between employer and employee; administration of plan is under code modelled after Federal Constitution; system is eminently successful.

Works Councils. Workmen's Councils (Los consejos de obreros). Revista Minera, Metallurgica y de Ingenieria, vol. 74, no. 2884, June 16, 1923, pp. 321–322. Reviews their establishment in various countries, their powers and functioning, attitude of trade unions toward them, etc.

EMPLOYEES, TRAINING OF

Highway Builders. Training Highway Builders, R. de L. French. Can. Engr., vol. 44, no. 25, June 19, 1923, pp. 611–612. Conditions demand trained engineers; classes of men available for training; analysis of fundamental and special studies. Paper read at Can. Good Roads Assn. annual convention.

Telephone Plant. A School for the Plant Employes, Robert M. Bruce. Telephony, vol. 84, no. 21, May 26, 1923, pp. 17–19. Educational plan for training plant employees adopted by Rochester Telephone Corp., which gives men an understanding of fundamentals. Paper presented at Rochester Convention of Up-State Assn.

ENAMELING

Electric Furnaces for. Vitreous Enameling with Electric Heat, A. E. O. Munsell. Am. Ceramic Soc.—Jl., vol. 6, no. 7, July 1923, pp. 794–798, 5 figs. Describes suitability of metallic resistor furnace for application of vitreous enamels; comparisons with fuel-fired furnaces.

EVAPORATORS

Vapor-Recompression. Calculation of Vapor Recompression Evaporators, L. A. Pridgeon. Chem. & Met. Eng., vol. 28, no. 25, June 25, 1923, pp. 1109–1111, 3 figs. It is possible to calculate with moderate degree of accuracy heat economy and capacity of vapor-recompression evaporators. Paper presented before Am. Inst. Chem. Engrs.

EXCAVATING MACHINERY

Lubrication. Lubrication of Excavating Machinery. Lubrication, vol. 9, no. 6, June 1923, pp. 61–69, 10 figs. Classification of excavating machinery; general lubrication; internal-combustion engines; gears, chains, and wire rope.

F

FACTORIES

Inspection. Administration of Labor Laws and Factory Inspection in Certain European Countries, George M. Price. Monthly Labor Rev., vol. 16, no. 6, June 1923, pp. 1–19. Important changes and features of progress of factory inspection in Europe during past decade, including salaries of inspectors, selection of inspectors, women inspectors, work, councils, shop committees, etc.

FANS

Standardization. American Fan Standardisation Code. Domestic Eng. (Lond), vol. 43, no. 6, June 1923, pp. 122–127, 5 figs. Code on testing and rating of fans, blowers, and centrifugal air compressors, formulated by committee of Am. Soc. Heat. & Vent. Engrs. and Nat. Assn. Fan Mfrs.

FARM MACHINERY

Construction and Use. Construction and Use of Agricultural Machinery (Om konstruktion och tillverkning av landtbrukemaskiner), Hjalmar de Laval. Teknisk Tidskrift, vol. 53, nos. 3 and 7, Jan. 20 and Feb. 17, 1923, pp. 6–10 and 16–20, 25 figs. Condition of agricultural machinery industry in Sweden and America, including sowing, reaping, plowing, hoeing, and harvesting machines.

FIRE PROTECTION

Fuel-Oil-Tank Fires. A New Method for Extinguishing Oil Fires, Charles W. Geiger. Power Plant Eng., vol. 27, no. 13, July 1, 1923, pp. 692–693, 2 figs. Solid sheet of water directly above surface of burning oil prevents ingress of oxygen; new type of fire-extinguishing apparatus for fuel-oil-tank fires.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 136

Heaters, Water Supply
Herbert Boiler Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.
* Erie City Iron Works
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water, Metering
* H. S. B. W.-Cochrane Corp'n

Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
Clarage Fan Co.
Midwest Steel & Supply Co. (Inc.)

Heating Specialties
* Fulton Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.

Hoists, Air
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n
Yale & Towne Mfg. Co.

Hoists, Electric
* Allis-Chalmers Mfg. Co.
* American Engineering Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
Yale & Towne Mfg. Co.

Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Locomotive & Coach
Whiting Corp'n

Hoists, Mine
Lidgerwood Mfg.Co.
* Nordberg Mfg. Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Hoists, Steam
(See Engines, Hoisting)

Holders, Nipple
Curtis & Curtis Co.

Hose, Acid
United States Rubber Co.

Hose, Air and Gas
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Fire
United States Rubber Co.

Hose, Gas
United States Rubber Co.

Hose, Gasoline
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Metal, Flexible
* Johns-Manville (Inc.)

Hose, Oil
United States Rubber Co.

Hose, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Hose, Steam
United States Rubber Co.

Hose, Suction
United States Rubber Co.

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n

Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Worthington Pump & Machinery Corp'n

Hydraulic Machinery
* Allis-Chalmers Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Press Control Systems (Oil Pressure)
American Fluid Motors Co.

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
Taylor Instrument Cos.

Hygrometers
Taylor Instrument Cos.

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Nordberg Mfg. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Gifford-Wood Co.

Idlers, Belt
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Indicators, CO
* Uehling Instrument Co.

Indicators, CO_2
Bacharach Industrial Instrument Co.
* Precision Instrument Co. (Inc.)
* Uehling Instrument Co.

Indicators, Engine
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Indicators, SO_2
* Uehling Instrument Co.

Indicators, Speed
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Injectors
* Lunkenheimer Co.
* Schutte & Koerting Co.

Injectors, Air
Croll-Reynolds Engrg. Co.

Inserts, Steel
Midwest Steel & Supply Co.

Instruments, Electrical Measuring
* General Electric Co.
Taylor Instrument Cos.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Instruments, Recording
* Ashton Valve Co.
* Bacharach Industrial Instrument Co.
* Bailey Meter Co.
Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* General Electric Co.
* Precision Instrument Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.
* Uehling Instrument Co.
* Westinghouse Electric & Mfg. Co.

Instruments, Scientific
Taylor Instrument Cos.

Instruments, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Insulating Materials (Electric)
* General Electric Co.
* Johns-Manville (Inc.)

Insulating Materials (Heat and Cold)
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
Croll-Reynolds Engineering Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
United States Rubber Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.
* Lunkenheimer Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.

Keys, Machine
Smith & Serrell
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.

Ladles
Northern Engineering Works
Whiting Corp'n

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
* Johns-Manville (Inc.)
* Westinghouse Electric & Mfg. Co.

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Levers, Flexible (Wire)
* Gwilliam Co.

Linings, Brake
* Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Furnace & Burner Corp'n
* Celite Products Co.
* Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
McLeod & Henry Co.
* Quigley Furnace Specialties Co.

Linings, Stack
* Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Furnace & Burner Corp'n

Loaders, Portable
* Gifford-Wood Co.
Link-Belt Co.

Lockers, Metal
ManufacturingEquip.&Engrg.Co.

Locomotives, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Locomotives, Storage Battery
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.

Machine Tool Feed Control Systems (Oil Pressure)
American Fluid Motors Co.

Machine Work
Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mch. Co.
Lammert & Mann Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Purvis Machine Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.
* Simplex Valve & Meter Co.

Mechanical Draft Apparatus
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.

Mechanical Stokers
(See Stokers)

Metal Treating
* American Metal Treatment Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Precision Instrument Co. (Inc.)
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Sprinklers. Fire Protection for Buildings of Small and Medium Size, Charles L. Hubbard. Bldg. Age, vol. 45, no. 6, June 1923, pp. 60–62, 6 figs. Sprinkler systems, piping arrangement for sprinklers, water supply; other inside protection.

FIREBRICK

Materials, Pennsylvania. The Fire Brick Materials of Pennsylvania, George H. Ashley. Am. Ceramic Soc.—Jl., vol. 6, no. 7, July 1923, pp. 837–849. Pennsylvania produces over 40 per cent of all clay firebrick and over 70 per cent of all silica firebrick made in United States; kinds of materials used.

FLAMES

Temperatures. Flame Temperatures, W. Trinks. Fuels & Furnaces, vol. 1, nos. 2 and 3, June and July, 1923, pp. 65–70 and 165–168, 12 figs. Gives set of graphs from which flame temperature can be read directly and explanation of their use.

FLOW OF FLUIDS

Measuring Apparatus. Demonstration of Steady Flow of Fluid, Shuichi Hayashi. Kyoto Imperial Univ., Memoirs of College of Science, vol. 6, no. 3, Mar. 1923, pp. 171–172, 6 figs. Apparatus by means of which stream lines of running liquid as well as gaseous substance in state of three-dimensional motion were made clearly visible.

Theory. Conduction of Fluids (La conductibilité des Fluides et les similtudes énergétique), P. Drosne. Chaleur et Industrie, vol. 4, no. 37, May 1923, pp. 408–412, 5 figs. Flow of fluids at great differences of pressure and velocity producing mainly mechanical effects, and flow of fluids at small or very small differences of pressure and velocity producing mainly thermic effects.

FLOW OF WATER

Hot Water. Flow of Hot Water Under Pressure and Its Possible Application (Sur l'écoulement de l'eau chaude sous pression et son application possible), M. Grauce. Revue de l'Industrie Minerale, no. 59, June 1, 1923, pp. 331–343, 10 figs. Compares energy of hot water with that of steam; hot-water piping theory of trompe; application of hot water for purpose of trompe, especially vacuum trompe.

Pipes. Flow Tests for Clay and Metal Culvert Pipe, Highway Engr. & Contractor, vol. 9, no. 1, July 1923, pp. 15–18, 8 figs. Details of tests made by U. S. Bureau Public Roads at hydraulic laboratory of State Univ. of Iowa, on vitrified clay pipe and corrugated metal pipe, and results obtained.

FLUE-GAS ANALYSIS

CO Testers. Electric CO Meters (Elektrischer CO-Messer), Max Möller. Siemens-Zeit., vol. 3, no. 5, May 1923, pp. 226–233, 7 figs. Apparatus heretofore used for determination of unburned gases; description of Siemens & Halske electric CO and CO_2 tester.

Effect of Sulphur Content of Coal. How Sulphur in Fuel Affects Flue-Gas Composition and Computations, C. Harold Berry. Power, vol. 58, no. 3, July 17, 1923, pp. 95–96, 1 fig. Simple statement of general nature of problem, and conclusions reached by author.

The Effect of Sulphur in Fuel on Flue-gas Composition and Computations, C. Harold Berry. Power, vol. 58, no. 3, July 17, 1923, pp. 113–115, 1 fig. Study of effect of sulphur content of coal upon flue-gas analysis and possible error this may cause in computing weight of dry flue gas per pound of fuel.

Excess-Air Determination. Excess Air in Gas Fired Apparatus, J. M. Davies and T. T. Gill. Gas Age-Rec., vol. 51, no. 23, June 9, 1923, pp. 727–728, 2 figs. Method of determining excess air in any gas-fired apparatus from CO_2 content of flue gases; separate curve can be plotted for any grade of gas.

FOUNDATIONS

Underpinning a Monument. Underpinning the Washington Monument. Sci. Am., vol. 129, no. 1, July 1923, pp. 32 and 72, 5 figs. Enlarging foundations to carry 550-ft. shaft.

FOUNDRIES

Brass Crucibles. Important Points on Brass Foundry Crucibles. Can. Foundryman, vol. 15, no. 6, June 1923, p. 16. Standard sizes of brass crucibles.

Conveying Apparatus in. Mechanical Conveying Apparatus in English and American Foundries (Mechanische Transportvorrichtungen in englischen und amerikanischen Giessereien). Giesserei-Zeitung, vol. 20, no. 13, June 1, 1923, pp. 243–245, 4 figs. Charging of cupola furnaces, overhead lines, preparation of sand, sand-conveying plants, etc.

Iron and Sand Recovery. Recovery of Iron and Sand in American Foundries (Zurückgewinnung des Eisens und des Sandes aus dem Giessereiabraum in Amerika), Graue. Giesserei-Zeitung, vol. 20, no. 13, June 1, 1923, pp. 239–242, 3 figs. Recovery of iron and coke from cupola-furnace residues; recovery of molding and core sand; processes in use in America.

Jobbing-Shop Methods. Production in Jobbing Shop, J. H. Eastham. Foundry, vol. 51, no. 13, July 1, 1923, pp. 517–519, 6 figs. Methods adopted by Russel Wheel & Foundry Co., Detroit, Mich., in turning out an order for 1920 gray-iron trough castings to be used in new filtration plant in Detroit.

Steel. New Steel Foundry at Fairfield Car Works. Iron Age, vol. 112, no. 3, July 19, 1923, pp. 137–140, 7 figs. Describes basic open-hearth plant of Tennessee Coal, Iron & Railroad Co., at its Fairfield Car Works, Birmingham, Ala., designed for manufacturing miscellaneous car castings on a large production basis; special features are modern facilities for handling materials, sanitation and comfort of employees.

FUELS

Economical Use. Fire and Heat; Laws of Heat Transmission (Le Feu, La Chaleur; Les lois de la transmission de la chaleur), Charles Roszak. Société Industrielle de l'Est—Bul., no. 168, Jan.-Mar. 1923, pp. 21–50. Utilization of fuels and transmission of heat obtained from them; factors in calorific energy; heat transmission, including conductivity, convection and radiation; efficient combustion of fuel.

Gaseous. Cold Clean Artificial Gas and a Discussion upon the General Properties of Gaseous Fuels, Alfred E. Blake. Am. Ceramic Soc.—Jl., vol. 6, no. 7, July 1923, pp. 808–826 and (discussion) 826–830, 5 figs. Notes on technology of gaseous fuels for benefit of glass manufacturers.

Some Aspects of Gaseous Fuel Utilisation, J. G. Clarke. Domestic Eng. (Lond.), vol. 43, nos. 5 and 6, May and June, 1923, pp. 99–105 and 115–120, 15 figs. Notes on development of bunsen burner and its practical application; types of governors; thermostatic control; chimney flues; flueless gas stoves; gas fires.

Great Britain. Notes on the Work of the British Fuel Research Board, C. H. Lander. Fuel in Sci. & Practice, vol. 2, no. 6, July 1923, pp. 191–194. Concise account of work and aims of Fuel Research Board of Great Britain. Problems of fuel economy.

Recovery from Ashes. Recovery of Fuel from Ashes, H. A. Prager. Chem. Age (Lond.), vol. 8, no. 209, June 16, 1923, pp. 638–640, 4 figs. Saving which can be effected by adoption of processes designed to reclaim combustible matter from ash dumps; describes Ullrich magnetic plant which has been adopted quite extensively in Europe.

Sources. World Sources of Mineral Fuels, E. G. Sievers. Gas Age-Rec., vol. 51, nos. 24 and 25, June 16 and 23, 1923, pp. 757–761 and 793–796, 5 figs. Study of economic importance of fuel resources and their bearing upon life of the nation; areas in which coal, oil and gas are found in United States; petroleum statistics and possibilities as a fuel; natural gas as a fuel.

[See also COAL; COKE; OIL FUEL; PEAT; PULVERIZED COAL.]

FURNACES

Boiler. See BOILER FURNACES.

Linings. Refractory a Factor in Furnace Life, J. S. Pieters. Forging & Heat Treating, vol. 9, no. 6, June 1923, pp. 260–262, 1 fig. Conditions furnace must meet; typical furnace difficulties; how to solve furnace problem. Failure of furnace linings usually originate at joints between bricks; use of monolithic linings greatly increases life of furnace.

Rotary, Heat Balance of. Heat Balance of a Rotary Furnace (Bilan thermique d'un four rotatif), Ch. Bertin. Revue des Matériaux de Construction et de Travaux Publics, nos. 164 and 165, May and June 1923, pp. 17–100 and 121–123, 8 figs. Heat of combustion; calories for evaporation of water; calories for decomposition of carbonates and for reactions; losses through chimney, by radiation and by cooling.

FURNACES, ENAMELING

Largest in World. The Largest Enameling Furnace in the World. Blast Furnace & Steel Plant, vol. 11, no. 6, June 1923, p. 313. Furnace constructed in Berlin, Germany has heating chamber of 23 by 16.4 by 16.4 ft.; heat distribution uniform throughout, obtained by triple gas heating with both gas and air under pressure control; brown coal in form of briquets or as raw coal can be used. Translated from Zeit. des Vereines deutscher Ingenieure.

Oil-Fired. Improved Type Enameling Furnace, Henry L. Read. Fuels & Furnaces, vol. 1, no. 2, June 1923, pp. 91–93, 3 figs. Describes oil-fired muffle furnace for burning enamel on steel and cast iron recently developed; single burner is distinctive feature; remarkably uniform temperature with low oil consumption is secured.

FURNACES, HEATING

Oil-Burning. An Installation for Heavy Fuel Oil, W. C. Buell. Iron Age, vol. 112, no. 3, July 19, 1923, pp. 129–132, 5 figs. Details of design and operation of heating furnace equipment of Hubbard & Co., Pittsburgh, Pa., designed to avoid high cost of light fuel oils and limitation in supply.

G

GAGES

Impact Strain. An Improved Impact Strain Gage, Earl B. Smith. Highway Engr. & Contractor, vol. 8, no. 6, June 1923, pp. 45–47, 7 figs. Also Good Roads, vol. 64, no. 23, June 6, 1923, pp. 217–218, 3 figs. Designed by U. S. Bur. of Public Roads to secure an instrument which would respond to and accurately measure deformations resulting from suddenly applied forces and impact.

GAS ENGINES

Blast-Furnace- and Coke-Oven-Gas-Driven. Large Gas Engines and Gas Power Works, Especially High-Capacity Engines (Ueber Grossgasmaschinen und Gaskraftwerke, insbesondere Hochleistungsmaschinen). Bergbau, vol. 36, nos. 5, 6 and 7, Mar. 8, 22 and Apr. 25, 1923, pp. 69–75, 89–94 and 105–107, 19 figs. Gas engines running on blast-furnace and coke-oven gas for mines; comparison of cost data with steam engines; gas-dynamo and gas-blower units, and their advantages; reduced heat consumption of high-capacity gas engines.

GASES

Specific Heat. The Variation of the Specific Heat of Air with Temperature, J. R. Partington and W. G. Shilling. Faraday Soc.—Trans., vol. 18, part 3, Feb. 1923, pp. 386–390 and (discussion) 390–393, 2 figs. Experiments in which attempt has been made to obtain reasonably accurate data for variation of specific heats of gases with temperature.

GASOLINE

Natural-Gas. Gasoline from Natural Gas—1921, E. G. Sievers. Gas Age-Rec., vol. 51, no. 26, June 30, 1923, pp. 821–824. Compression gasoline recovery method; absorption recovery method; charcoal process for gasoline recovery; combination compression and absorption methods; blending of gasolines; economics of natural-gas gasoline industry.

GEARS

Bevel. Computing Pitch of Bevel Gears, George F. Nordenholt. Machy. (N. Y.) vol. 29, no. 11, July 1923, pp. 886–888, 1 fig. Calculation of pitch by applying Tredgold's approximation and then computing pitch of "formative spur gear."

Spiral Bevel Gears. Engineer, vol. 135, nos. 3521 and 3522, June 22 and 29, 1923, pp. 649–652 and 677–678, 8 figs. Principles; spiral angle; hand of spiral driving load; tooth proportions; methods of cutting; finishing cutter settings; formulas for spiral bevel gears.

Change Gears for Fixed Centers. Designing Change Gears for Fixed Centres. Machy. (Lond.), vol. 22, no. 560, June 21, 1923, pp. 362–366. Designing gear sets for pick-off type of change gears which consist of gears that are interchangeable on pins or shafts having a fixed center distance, used in designing production tools.

GLASS

Grinding and Polishing. The Grinding and Polishing of Plate Glass (Das Schleifen und Polieren von Spiegelglas), Adolf Schild. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 22, June 2, 1923, pp. 538–543, 19 figs. Basic principle of grinding; grinding devices for cast and blown plate glass-polishing devices, design and operation.

GRINDING

Chatter Marks. Outlines Cause of Chatter Marks, Karl G. Keck. Abrasive Industry, vol. 4, no. 6, June 1923, pp. 170–171. Causes, location, and prevention of chatter; can be eliminated by proper attention to grinding machine and wheel.

Surface. Surface Grinding From the Rough, Douglas T. Hamilton. Abrasive Industry, vol. 4, no. 6, June 1923, pp. 167–169, 8 figs. In designing a new machine the parts were proportioned so that they could be located readily for grinding.

GUNS

Cannon. Development of Automatic Cannon, T. M. Jervey. Army Ordnance, vol. 3, no. 18, May-June, pp. 350–353, 3 figs. Reasons for delay in development, increasing need for automatic cannon, suggestions for design.

Small Arms. A Review of Small Arms Development, Lee O. Wright. Army Ordnance, vol. 3, no. 18, May-June, 1923, pp. 309–317, 7 figs. Includes shoulder rifles, machine guns, their ammunition and accessories. Defects developed during war pointed out, together with steps taken to correct them.

H

HANDLING MATERIALS

Assorted Materials. Better Handling for Assorted Materials, Matthew W. Potts. Indus. Management (N. Y.), vol. 66, no. 1, July 1923, pp. 7–13, 12 figs. Putting parts and package goods through plant at less cost; equipment.

Furnaces. Handling Materials in Furnaces, Frank W. Brooke. Iron Trade Rev., vol. 73, no. 2, July 12, 1923, pp. 111–113, 6 figs. Relation of materials-handling methods to design and operation of furnace. Abstract of paper before Am. Electrochem. Soc.

[See also COAL HANDLING; COKE HANDLING.]

HARDNESS

Testing. Some Recent Developments in Hardness Testing, Edward G. Herbert. Engr., vol. 135, no. 3522, June 29, 1923, pp. 686–687, 2 figs. Analysis of qualities generally comprised under the term hardness; nomenclature.

Testing Material Hardness on a Commercial Basis, E. F. Lake. Can. Machy., vol. 29, no. 23, June 7, 1923, pp. 32–34, 1 fig. Adaptation and advantages of different methods; some of difficulties encountered; how some readings mislead.

HEAT

Mechanical Equivalent of. The Mechanical Equivalent of Heat, T. H. Laby. Commonwealth Engr., vol. 10, no. 8, Mar. 1, 1923, pp. 279–284, 3 figs. Requirements of a mechanical-equivalent-of-heat experiment and principle thereof; details regarding design of apparatus.

Radiation. The Influence of Air Currents on Heat Radiating Surfaces, H. C. B. Berkhout. Domestic Eng., (Lond.), vol. 43, no. 6, June 1923, pp. 113–114. Describes experiments on heat emitted from a hot surface to air currents that pass over it, conducted by Prof. W. Nusselt and W. Jurgens of Mechanical Laboratory of Technical Academy of Carlsruhe.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 130

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Shepard Elect. Crane & Hoist Co.
* Westinghouse Electric & Mfg. Co.

Motors, Synchronous
* Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
Linde Air Products Co.

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
* Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Lunkenheimer Co.

Oil and Grease Guns
* Royersford Fdry. & Mach. Co.

Oil Burning Equipment
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons Improved Equipment Co.
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

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* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

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* Brownell Co.
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* Titusville Iron Works Co.
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Lunkenheimer Co.

Oiling Systems
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Lunkenheimer Co.

Oils, Fuel
Texas Co.

Oils, Lubricating
Texas Co.
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Ovens, Core
Whiting Corporation

Oxy-Acetylene Supplies
Linde Air Products Co.

Oxygen Gas
Linde Air Products Co.

Packing, Ammonia
France Packing Co.
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Packing, Asbestos
* Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
* Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Packing Rubber
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
United States Rubber Co.

Packing Sheet
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
Steel Mill Packing Co.
United States Rubber Co.

Paints, Concrete (For Industrial Purposes)
Smooth-On Mfg. Co.

Paint, Metal
Dixon, Joseph Crucible Co.
* General Electric Co.
* Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paper, Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
DuPont Engineering Co.

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American Lead Pencil Co.
Dietzgen, Eugene Co.
Dixon, Joseph Crucible Co.
Keuffel & Esser Co.

Penstocks
Smith, S. Morgan Co.

Petroleum Products
Texas Co.

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* U. S. Cast Iron Pipe & Fdry. Co.

Pipe, Riveted
* American Spiral Pipe Wks.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe, Welded
* American Spiral Pipe Wks.
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Plate Metal Work
(See Steel Plate Construction)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Morse Chain Co.
* Poole Engrg. & Mch. Co.
* Royersford Fdry. & Mach. Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
Philadelphia Drying Machy. Co.

Presses, Foot
* Royersford Fdry. & Mach. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Machy. Co.

Presses, Punching and Trimming
Long & Allstatter Co.
* Royersford Fdry. & Mach. Co.

Presses, Wax
* Vogt, Henry Machine Co

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machy. Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Machine Co.
Link-Belt Co.
* Medart Co
* Wood's, T. B. & Sons Co.

Pulleys, Iron
Brown A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
Kenworthy, Chas. F. (Inc.)

Pulverizers
Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc. Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Outfits
Midwest Engine Corp'n

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
Taber Pump Co.
* Titusville Iron Works Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
Midwest Engine Corp'n
* Morris Machine Works
* Nordberg Mfg. Co.
Taber Pump Co.
* Westinghouse Electric & Mfg.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Deep Well, Axial
Midwest Engine Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Nordberg Mfg. Co.
Taber Pump Co.
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
Midwest Engine Corp'n
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

HEATING

Buildings. Heat Supply (Om Varmeforsyning af Bykvarterer), F. C. Becker. Teknisk Tidsskrift, vol. 47, no. 5, 6 and 7, Feb. 28, Mar. 14 and 28, 1923, pp. 29–39, 45–51 and 53–60, 12 figs. partly on supp. plates. Heating systems for large buildings, and production of heat on a large scale; distribution of heat over great distances; rational use of fuel by combining power and heat production; details of design, equipment and operation with cost data of Gathersgades, Orsted, Finsen, Hortensia, and Aarhus electric central stations.

HEATING AND VENTILATING

Conservatories. Heating, Ventilating and Humidifying One of the World's Largest Private Conservatories. Heat. & Vent. Mag., vol. 20, no. 6, June 1923, pp. 39–43, 8 figs. Unique methods followed in design of equipment for Dupont horticultural buildings at Longwood, Inc.

HEATING, STEAM

Buildings. Heating of Medium-Sized Buildings, Charles L. Hubbard. Domestic Eng., vol. 103, no. 10, June 9, 1923, pp. 487–490, 3 figs. Heating of homes, small apartments and hotels, laying special stress on airline vacuum system. Advantages of steam heating.

Industrial Plants. Heating of Industrial Plants (Le chauffage des locaux industriels), H. Benner. Chaleur et Industrie, vol. 4, no. 37, May 1923, pp. 313–414. 5 figs. Discusses a simple modification in steam heating for considerably increasing efficiency by adding a second radiator below first for utilizing heat of steam in automatic cleaner.

HOISTS

Electric. Recent Developments in Electric Hoists, Graham Bright. Coal Industry, vol. 6, no. 6, June 1923, pp. 289–295, 8 figs. Describes latest developments in electric mine hoists, discussing various types in use and their application.

HUMIDITY

Measurement. Determination of Relative Humidity at Temperatures below 32 deg. F., George A. Horne. Ice & Refrigeration, vol. 64, no. 6, June 1923, pp. 486–487. Experimental work with sling psychrometer. Presented before Am. Assn. Ice & Refrigeration.

[See also Air Conditioning.]

HYDRAULIC DRIVE

Machine Tools. Hydraulic Feed Drive Adapted to Machine Tools, Walter Ferris. Can. Machy., vol. 29, no. 24, June 14, 1923, pp. 16–18, 7 figs. Accuracy and flexibility of speed control; ability to stand abusive accelerating and stalling loads without overheating; effective application to mechanical equipment.

HYDRAULIC TURBINES

Calculation with Bernoulli's Equation. Bernoulli's Equation on the Theory of Turbines (Om Bernoullis ekvationer och ansatser till en kompletterring av turbinteorien), Hjalmar O. Dahl. Teknisk Tidskrift, vol. 53, no. 7, Feb. 17, 1923, pp. (Mekanik 2 Section) 13–16, 6 figs. Examples of calculations.

HYDROELECTRIC DEVELOPMENTS

Ontario. Hydroelectric Developments in Ontario, F. G. Gaby. Mech. Eng., vol. 45, no. 7, July 1923, pp. 410–415 and (discussion) p. 416, 6 figs. Present and projected developments of hydroelectric power, together with particulars regarding largest single hydroelectric development in world, the Queenston-Chippawa installation. (Abridged.)

Problems. Some Problems of Water Power Development, C. F. Mackness. Beama, vol. 12, nos. 61 and 62, May and June 1923, pp. 274–283 and 356–364, 12 figs. Discusses underlying engineering principles, indicating difficulties in choosing best of number of possible solutions for each leading factor in problem. Deals with power production, plan of development, water storage, auxiliary water supply, etc.; various kinds of development; civil-engineering problems; mechanical engineering.

Quebec. Hydroelectric Possibilities of Quebec, Julian C. Smith. Mech. Eng., vol. 45, no. 7, July 1923, pp. 407–409 and 429, 1 fig. Potential and actual hydroelectric development of Province of Quebec and its probable rate of growth in future. (Abridged.) Discussion on p. 416.

Vermont. Davis Bridge Development of the New England Power Company, A. C. Eaton and E. B. Collins. Elec. World, vol. 81, no. 24, June 16, 1923, pp. 1410–1413, 6 figs. Consists of storage reservoir having usable capacity of 111,000,000 acre-ft. and plant with installed capacity of 60,000 hp., operating under mean head of 350 ft.; part of Deerfield River project.

Wisconsin. Big Falls Development on Flambeau River, L. B. Breedlove. Power, vol. 58, no. 3, July 17, 1923, pp. 84–87, 6 figs. Three-unit plant of 9900 kva. capacity operating under net head of 52 ft. and average flow of 1600 sec-ft., to be tied in with four other hydroelectric developments of Lake Superior District Power Co.; two 3300-kva. units now installed; dam and spillway construction; special reinforcing of scroll case by means of steel bands secured to rim of speed ring.

HYDROELECTRIC PLANTS

California. Don Pedro Dam, Power Plant and Transmission Line, W. A. Scott. Eng. World, vol. 22, no. 66, June 1923, pp. 361–363, 10 figs. Details of dam and hydroelectric plant on Tuolumne River, in California, and 33-mi. transmission line from power plant to substation; dam is concrete arched structure, gravity type, built on curvature of 674-ft. radius.

France. The New Plant of the Drac-Romanche Company at Pont de Claix, Isère [La nouvelle usine de la Société du Drac-Romanche à Pont-de-Claix (Isère)], Pierre Thierry-Mieg. Société Industrielle de Mulhouse—Bul., vol. 89, no. 4, Apr. 1923, pp. 247–262, 9 figs. Describes new hydroelectric plant of 15,000 hp.; available water power, barrage work, reinforced-concrete pressure conduits 6 m. in diameter, electric equipment, generators, alternators, exciters, etc.

Spain. The Carpio Falls of the Guadalquivir (Salto de El Carpio en el Guadalquivir), Carlos Mendoza. Revista de Obras Publicas, vol. 71, no. 2383, June 15, 1923, pp. 54–58, 5 figs. Describes new hydroelectric installation of Mengemor Company, of 10,500 hp.; details of Stoney type barrage dams, tunneling work, power station, etc.; three-phase alternators producing 5000 volts stepped-up to 50,000 by transformers.

Sweden. The Skar Power Plant (Skar kraftanlaegs Tryktunnel), H. Kjeldset. Teknisk Ukeblad, vol. 70, no. 14, Apr. 6, 1923, pp. 130–133, 1 fig. A hydroelectric plant situated near Kristiansund which it supplies with current; describes tunneling, pressure piping, specifications for construction material, etc.

I

ICE MANUFACTURE

Raw-Water Systems. Possibilities of Making Clear Raw Water Ice without Air Agitation, Van Rensselaer H. Greene. Ice & Refrigeration, vol. 64, no. 6, June 1923, pp. 494–495. Discusses various raw-water systems and new system which does not make use of air agitation. Presented before Am. Assn. Ice & Refrigeration.

ICE PLANTS

Cleveland, Ohio. New Plant of the City Ice & Fuel Co., Cleveland, O. Ice & Refrigeration, vol. 64, no. 6, June 1923, pp. 505–516, 29 figs. Description of plant, which has daily capacity of 125 tons of ice and operates on Artic-Pownall stationary can system.

Design. Design of an Ice Making Plant, H. J. Macintire. Southern Engr., vol. 39, no. 3, May 1923, pp. 42–45, 6 figs. Figuring heat removed per pound of ice; cooling agitating air, size of tank and amount of piping.

INDEXING

Magazine Articles. How to Keep Magazine Articles and Find Them, Harrison W. Craver. Management & Administration, vol. 6, no. 1, July 1923, pp. 79–83, 4 figs. Describes indexing system of this journal and of Engineering Societies Library; how index is used and directions for making it.

INDUSTRIAL MANAGEMENT

Production Methods. Mass-Production Methods. Times Trade & Eng. Supp., vol. 12, no. 256, June 2, 1923, p. 277. Disadvantages of system for England; expenses involved, fixed design, field of application, etc.

Purchasing. A Gage of Purchasing Efficiency. Chem. & Met. Eng., vol. 28, no. 24, June 18, 1923, pp. 1064–1065. Accounting method that enables executives to judge purchasing agent and his judgment of markets.

Routing Through Assembly. Routing Automobiles Through Assembly. Management & Administration (Management Eng. & Administration Combined), vol. 6, no. 1, July 1923, p. 48. Assembling engines; chassis assembled on opposite side of room; turning chassis broadwise and upside down.

Stabilizing Employment. Safeguarding Industry by Stabilizing Employment, W. I. King. Taylor Soc.—Bul., vol. 8, no. 3, June 1923, pp. 85–89 and (discussion) 89–95. Based upon information collected by Natl. Bur. Economic Research; measuring changes in employment.

Taylor System. See TAYLOR SYSTEM.

Workshops. Improvements in Workshop Management (Verbesserungen im Werkstättenbetrieb), G. Lunz. Verkehrstechnik, vol. 40, no. 22, June 1, 1923, pp. 185–187. Criticizes time-piece rate in German railway shops, and explains new method based on minimum number of workers and maximum output, and bonus payment.

INDUSTRIAL TRUCKS

Efficient Operation. How to Improve Truck Efficiency, H. L. Williams. Motor Transport (N. Y.), vol. 28, no. 11, July 1, 1923, pp. 310–312, 5 figs. Relation of cost to mileage; suggestions on solving problem.

Electric. Elgctric Factory Trucks (Elektrotransportkarren zur Einschränkung der Betriebsunkosten). Zeit. für die gesamte Giessereipraxis, vol. 44, no. 21–22, June 2, 1923, pp. 122–123, 2 figs. Describes Hansa-Lloyd, a 4-wheeled storage-battery platform truck with capacity of 1½ tons, 10 km. p.h. speed, 1–20 at full load gradient, 2½ to 5-hp. motor, used in factories, warehouses, railways, docks, etc.

INSULATING MATERIALS, HEAT

Properties. Insulating Materials (Les matériaux isolants), Jules Dautrebande. Chaleur et Industrie, vol. 4, no. 37, May 1923, pp. 419–420. Deals with felt, paper, silk, kieselguhr, and other insulating materials, their properties, coefficient of conductivity, etc.

INTERNAL-COMBUSTION ENGINES

Air-Cleaner Tests. Efficiency of Dust Separation in Air Cleaners for Internal Combustion Engines, Arthur H. Hoffman. Agricultural Eng., vol. 4, no. 6, June 1923, pp. 89–95, 11 figs. Complete report of California air-cleaner tests, including description of apparatus and methods of testing.

Fuel Economy. Internal Combustion and Economy, Tage D. Madsen. Inst. Mar. Engrs.—Trans., vol. 35, June 1923, pp. 1–16 and (discussion) 16–34. Fuel problems encountered in shipping industry. Economy lying in use of heavy-oil engines.

Theory. Contribution to the Theory of Internal-Combustion Engines (Una contribution a la théorie des moteurs à combustion interne), Marcus Brutzkus. Académie des Sciences—Comptes Rendus des Séances, vol. 176, no. 23, June 4, 1923, pp. 1621–1623. Discusses chemical reaction of combustion which takes place in time available (about 0.05 sec.), and most suitable properties of fuels for the purpose; combustion under variation of pressure and of concentration; enumerates three laws.

[See also AIRPLANE ENGINES; AIRSHIPS, Engines; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; MOTORCYCLES, Engines; OIL ENGINES; SEMI-DIESEL ENGINES.]

IRON

Carbon Content. Notes on Carbon in Foundry Irons and Castings; Utility of its Control and Practical Difficulties, M. Siegle. Foundry Trade Jl., vol. 27, no. 356, June 14, 1923, pp. 484–488, 12 figs. Silicon and carbon content in pig irons and their effects; chemical classification of pig-irons; sulphur content; melting; etc.

Corrosion. Corrosion of Iron in Concrete. Concrete & Constructional Eng., vol. 18, no. 6, June 1923, pp. 393–394. Recommendations by Bruno Zscholke, of the Zurich Inst. for Testing Matls. to prevent corrosion.

IRON CASTINGS

Reversed Chilled. Reversed Chilled Castings and Similar Phenomena (Der umgekehrte Hartguss und ähnliche Erscheinungen), E. Dübi. Schweizerische Bauzeitung, vol. 81, nos. 19 and 20, May 12 and 19, 1923, pp. 227–229 and 249–252, 19 figs. Author reviews briefly works of other investigators and gives results of his own investigation on causes and origin of reversed chilled castings.

IRON FOUNDING

Camber Problems. Solving Camber Problems, F. C. Edwards. Metal Ind. (Lond.), vol. 22, no. 24, June 15, 1923, pp. 623–624, 3 figs. Problems frequently encountered in foundry; effect of alteration of pattern.

Chaplet Avoidance. Avoiding Chaplets, James Edgar. Metal Ind. (Lond.), vol. 22, no. 25, June 22, 1923, pp. 637–638, 4 figs. Disadvantages of chaplets; use at bottom of mold; modifications of design; use of balance print.

IRON, PIG

Electric, Production of. Production of Pig Iron in the Electric Furnace (La fabrication de la fonte au four electrique), Clausel de Coussergues. Société des Ingénieurs Civils de France—Procès-Verbal, no. 10, May 11, 1923, pp. 353–354. Discusses development since Heroult's furnace at Sault Sainte Marie; electric blast furnace and its comparison with ordinary blast furnaces.

L

LABOR

German Conditions. Labor, Wages and Unemployment in Germany, M. L. Goldsmith. Commerce Reports—Supp., Trade Information Bul., no. 106, June 11, 1923, 17 pp. Organization of German labor; economic position of labor under Empire; labor during war; legislative trend since revolution; present status of legislation; post-revolution development of labor unionism; agricultural labor; situation in specific fields; wage scales in certain industries; government attitude.

Poland. Polish Labour Legislation, H. Baumgarl. Int. Labour Rev., vol. 7, no. 6, June 1923, pp. 841–860. Important general principles of social legislation laid down during first period of reconstruction in Poland, ending with work of Polish Constituent Diet. Difficulties which have been encountered.

Wages and Hours. Wages, Hours and Employment in American Manufacturing Industries. Nat. Indus. Conference Board—Research Report, no. 59, 158 pp., 8 tables, 9 charts. Survey covering period of July 1914 to January 1923, with supplemental data up to April 1923.

LABORATORIES

Research. Research Plant of the National Bureau for Scientific and Industrial Research and Inventions (L'installation de recherches et d'expériences électriques de l'Office national des Recherches scientifiques et industrielles et des inventions), J.-L. Breton. Revue Générale de l'Electricité, vol. 13, no. 22, June 2, 1923, pp. 909–923, 24 figs. Description of equipment, including switchboard arrangement, transformers, generators, motors, converters, equipment of electrochemical and other laboratories.

Testing. The Arts et Métiers Testing Laboratory and Its Work During 1919 to 1922 (Le Laboratoire d'Essais du Conservatoire des Arts et Métiers, ses travaux durant les exercices 1919 à 1922). Revue Générale de l'Electricité, vol. 13, no. 24, June 16, 1923, pp. 1016–1019. Financial and technical de-

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 136

Pumps, Filter Press
Buffalo Steam Pump Co.
* Goulds Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.
Taber Pump Co.

Pumps, Hydraulic
American Fluid Motors Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring
Wayne Tank & Pump Co.

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)

Pumps, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Lunkenheimer Co.
Midwest Engine Corp'n
Taber Pump Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Oil (Hand)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Divsion)
* Goulds Mfg. Co.
* Lunkenheimer Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Smidth, F. L. & Co.
Taber Pump Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
Taber Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co
Midwest Engine Corp'n
* Morris Machine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Punches, Metal Hand (Power)
* Parker-Kalon Corp'n

Punches, Multiple
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Punches, Power
* Royersford Fdry. & Mch. Co.

Punches and Dies
* Royersford Fdry. & Mch. Co

Punching and Coping Machines
Long & Allstatter Co.

Punching and Shearing Machines
Long & Allstatter Co.
* Royersford Fdry. & Mch. Co

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
Elliott Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Superheater Co.
Taylor Instrument Cos.

Pyrometers, Optical
Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co.

Pyrometers, Radiation
Taylor Instrument Cos.

Racks, Machine, Cut
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Railways, Industrial
Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recorders, CO
* Uehling Instrument Co.

Recorders, CO_2
* Uehling Instrument Co.

Recorders, SO_2
* Uehling Instrument Co.

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Johns-Manville (Inc.)
* Nordberg Mfg. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Blower
* Davis, G. M. Regulator Co.

Regulators, Damper
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Parker-Kalon Corp'n

Regulators, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Feed Water
* Edward Valve & Mfg. Co.
Elliott Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Humidity
* Fulton Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Fulton Co.
* General Electric Co.
* Kieley & Mueller (Inc.)
Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
Taylor Instrument Cos.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
Long & Allstatter Co.

Roller Bearings
(See Bearings, Roller)

Rolling Mill Machinery
Mackintosh-Hemphill Co.

Rolls, Crushing
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Rolls, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
* Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
* Johns-Manville (Inc.)

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope Drives
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rubber Goods, Mechanical
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
United States Rubber Co.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Water Intake (Traveling)
Chain Belt Co.
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Drive (Hardened)
* Parker-Kalon Corp'n

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker-Kalon Corp'n

Screws, Set
Allen Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H.S.B.W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Machy. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

Shafting, Cold Drawn
* Medart Co.

Shafting, Flexible
* Gwilliam Co.

Shafting, Turned and Polished
Cumberland Steel Co.
Link-Belt Co.

Shapes, Brick
McLeod & Henry Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Shears, Alligator
Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Shears, Plate
Long & Allstatter Co.
Mackintosh-Hemphill Co.

Sheaves, Rope
Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Nordberg Mfg. Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Sheets, Rubber, Hard
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Shelving, Metal
Manufacturing Equip. & Engrg. Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp Wm. & Sons Ships & Engine Bldg. Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

tails of its activities, including physical tests, metals, building materials, machinery and chemical tests.

LATHES

Automatic Piston. Machine Tools for Railway Shops. Ry. Gaz., vol. 38, no. 23, June 8, 1923, pp. 850-851, 2 figs. Ryder automatic lathe for piston and piston-ring manufacture.

Tool-Room. New Tool-Room Lathe. Iron Age, vol. 111, no. 26, June 28, 1923, p. 1835, 2 figs. Design of geared head a feature; new universal relieving attachment on 15-in. heavy-duty lathe, placed on market by R. K. LeBlond Machine Tool Co., Cincinnati.

LEATHER

Artificial, Manufacture of. The Process of Manufacturing Artificial Leather, A. H. Berwald. Automotive Mfr., vol. 65, no. 3, June 1923, pp. 22-24, 8 figs. Raw materials used and how they are handled and treated; special machinery. Reprinted from DuPont Mag.

LIGHT

Velocity of. On the Principle of the Light-Velocity Toshizô Matsumoto. Kyoto Imperial Univ., College of Sci.—Memoirs, vol. 6, no. 5, Mar. 1923, pp. 187-190. Evolves equations based upon Einstein theory.

LIGHTING

Automatic Apparatus, Manufacture of. The Manufacture of Automatic Lighting Apparatus. Machy. (Lond.), vol. 22, no. 560, June 21, 1923, pp. 371-376, 14 figs. Operations in plant of Horstmann Gear Co., Ltd., Bath, England, in manufacturing controlling apparatus for automatic lighting and extinguishing, such as for street gas lamps.

High Illumination Intensity. Source of Light Giving Very High Surface Intensity (Ueber eine Lichtquelle von sehr hoher Flächenhelligkeit), H. Gerdien and A. Lotz. Zeit. fur Technische Physik, vol. 4, no. 4, 1923, pp. 157-162, 13 figs. Results of experiments for production of a light exceeding that of pure carbon are 20 to 50 times in surface intensity.

LOCOMOTIVES

Boosters for. The Tender Tractor—A New Booster Development. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 1000-1009, 18 figs. Locomotive tender weights utilized to broaden useful field for booster in practical application on Delaware & Hudson.

Development. The Outline of Steam Locomotive History, Samuel M. Vauclain. Ry. Rev., vol. 72, no. 25, June 23, 1923, pp. 1065-1070, 21 figs. History of development. (Abstract.) Paper read before Am. Ry. Assn.

Electric. See ELECTRIC LOCOMOTIVES.

Erie R. R. Latest Locomotive Types for the Erie R. R. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 986-988, 3 figs. Tractive and steaming capacity of previous designs augmented by application of specialties to new freight and passenger power.

4-6-0. New 4-6-0 Type Express Locomotives, London Midland & Scottish Railway. Ry. Gaz., vol. 38, no. 26, June 29, 1923, p. 956, 4 figs. partly on p. 957. Data on new 4-cylinder locomotive, giving total weights in working order and dimensions; has tenders of new design having capacity of 3000 gal. water and 6 tons coal; tractive effort 29,470 lb.

Lignite-Burning. Mountain Type Locomotive Designed to Burn Lignite. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 992-999, 13 figs. New C. B. & Q. R. R. passenger power operated on longest locomotive runs with low-grade fuel.

Long Runs. Long Locomotive Runs. Baldwin Locomotives, vol. 2, no. 1, July 1923, pp. 35-46, 20 figs. Items that must be especially considered in determining maximum length of run that is practicable; details of runs made by several railways in United States.

Mountain Type. Mountain Type Locomotive, Canadian National Railways. Can. Ry. & Mar. World, no. 305, July 1923, pp. 311-314, 5 figs. Bituminous-coal passenger-train locomotives, tractive power 49,600 lb. Detailed description.

Pilliod-Sleeve-Valve. Pilliod Sleeve Valve Performance on the Monon R. R. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 988-992, 4 figs. First report of service on Mikado-type locomotive shows theoretical advantages and practical maintenance features.

Tank. New German-Built Locomotives for Bulgaria. Ry. Gaz., vol. 38, no. 24, June 15, 1923, p. 880, 2 figs. Powerful 2-cylinder compound tank locomotives having 0-12-0 wheel arrangement built by Hanover Machine Co.

LUBRICATING OILS

Dilution. The Dilution of Lubricating Oil. Motor Transport (Lond.), vol. 36, no. 956, June 25, 1923, pp. 771-772, 1 fig. How to reduce the contamination of engine oil by fuel and water which encourages failure and rapid wear of bearings.

LUMBER

Austria and Italy. Lumber in Austria and Italy, W. F. Upson and Leon Dominian. Commerce Reports—Supp., Trade Information Bul., no. 110, June 25, 1923. Includes related reports on Italian lumber trade by A. A. Osborne.

M

MACHINE GUNS

Aircraft. The U. S. Aircraft Machine Gun, Walter T. Gorton. Army Ordnance, vol. 3, no. 18, May-June, pp. 333-336, 4 figs. Design of gun developed to meet requirements for an ideal synchronized gun of standard caliber.

MACHINE SHOPS

British. Derby Works of the International Combustion Engineering Co., Ltd. Engineer, vol. 135, no. 3521, June 22, 1923, pp. 652-654, 14 figs. partly on supp. plate. Details of new works for construction of underfeed stokers.

MACHINE TOOLS

Efficiency and Output. Machine Tool Efficiency and Output (Bidrag til Belysning af Arbejdsmaskinernes Drifts-Økonomi), Fr. Christoffersen. Teknisk Tidsskrift (Tekniske Forenings), vol. 47, no. 10, May 9, 1923, pp. 93-97, 3 figs. Time of production; methods of arriving at cost; calculations.

Multiple-Tooling. Traverse in Tooling Operations. Mech. World, vol. 73, no. 1901, June 8, 1923, pp. 354-355, 7 figs. Effects of introduction of newer machine tools in which multiple tooling or multiple work-holding is important feature.

MACHINERY

Friction in. Friction in Machines (Les frottements dans les machines), Jean Lévy. Technique Moderne, vol. 15, no. 12, June 15, 1923, pp. 357-364, 9 figs. Variation of coefficient of friction with velocity and load; viscosity and liquid friction; lubrication; frictional resistance; loads on lubricated surfaces; concludes that for a given bearing load may be increased directly as velocity of rotation and viscosity of oil, and that for a given oil permissible load is not constantly proportional to velocity.

MARINE BOILERS

Oil-Burning. The Clyde Pressure Jet System of Oil-Burning. Shipbldg. & Shipg. Rec., vol. 21, no. 23, June 7, 1923, pp. 733-736, 7 figs. Oil is projected under pressure into furnace in form of a finely atomized conical spray by means of a special oil-fuel pump which draws its supply from settling or storage tanks through a strainer of coarse mesh where foreign matter mixed with oil is deposited and can be removed periodically; details of pumping and heating unit.

MEASURING INSTRUMENTS

Thermotechnical. Modern Thermotechnical Measuring Instruments for Metallurgical Works (Neuere wärme- und betriebstechnische Messgeräte), Guido Wunsche. Stahl u. Eisen, vol. 43, no. 23, June 7, 1923, pp. 753-757, 9 figs. Apparatus for accurate determination of gas pressures; development of gaging scales; measuring diaphragms; automatic control and regulation; regulation of mixtures; etc.

METALS

Base. A Review of the Base Metal Industry with Special Reference to the Resources of the British Empire, Richard Redmayne. So. African Eng., vol. 34, nos. 5 and 6, May 31 and June 30, 1923, pp. 97-99 and 125-126. Reviews position of copper, lead, zinc, tin and aluminum. Paper read before Soc. of Arts.

Calorizing. The Use of Calorized Metal in Places Subject to High Temperatures, G. D. Mantle. Fuels & Furnaces, vol. 1, no. 1, May 1923, pp. 25-28, 3 figs. Definition, application, results.

Testing. Mechanical Tests of Metals (La pratique des essais mécaniques des métaux), Jean Durand. Génie Civil, vol. 82, no. 22, June 2, 1923, pp. 525-528, 5 figs. Discusses elongation, resiliency, and hardness testing, and apparatus used.

MOTOR BUSES

Bristol. The New Bristol Two-Tonner. Motor Transport (Lond.), vol. 34, no. 945, June 11, 1923, pp. 715-717, 9 figs. Details of 25-passenger bus, having four-cylinder 45-b.hp. at 1850 r.p.m. engine.

Design. The Design and Maintenance of Passenger and Commercial Motor Vehicles, G. J. Shave. Inst. Transport—Jl., vol. 4, no. 8, June 1923, pp. 304-308. It is shown that motor-truck chassis cannot be successfully employed for omnibus and that passenger-carrying vehicle should be specially designed; details of ties and springing, body work, ventilation, and transmission.

Lighting Generator for. North East Generator for Buses. Motor Transport (N. Y.), vol. 28, no. 10, June 15, 1923, pp. 280-281, 2 figs. New heavy-duty 12-volt model for bus lighting brought out by North East Elec. Co. has output rating of 300 watts. Proper wiring is described.

London General Omnibus Co. New London Bus Differs Materially from Previous Models, M. W. Bourdon. Automotive Industries, vol. 48, no. 25, June 21, 1923, pp. 1319-1321, 5 figs. Lower floor and platform heights chief features of 1923 type; pressed steel replaces flitch plates for frame; detachable top for winter use can be adjusted in 10 min.

MOTOR TRUCKS

Gasoline-Electric. Gasoline-Electric Transport Train "Gigant" (Benzin-Elektrischer Transportzug "Gigant"). Wirtschaftsmotor, no. 10, Oct. 1922, pp. 7-8, 2 figs. Built by Austrian Diamler Motor A. G.; consists of a truck and a trailer, truck producing necessary electric energy; 150-hp. water-cooled six-cylinder gasoline engine coupled to 90-kw. d. c. dynamo; truck fitted for very heavy loads.

Operating Costs. Truck Operating Costs, Ben H. Petty. Purdue Univ., Bul. Eng. Experiment Station, no. 10, vol. 7, no. 1, Feb. 1923, 44 pp., 13 figs. Results of investigation of operating costs in Indiana; simple presentation as to how and why a truck operator should record operating cost data.

Piston Displacement. Piston Displacement Factors Found for Motor Trucks, P. M. Heldt. Automotive Industries, vol. 49, no. 2, July 12, 1923, pp. 66-67, 1 fig. Discusses relation to vehicle loaded weight, driving wheel diameter and direct gear-drive ratio; analysis follows lines of similar study previously made for passenger cars.

MOTORCYCLES

Engines. Review of the Motor Cycle Engine, A. Rutherford. Practical Engr., vol. 67, nos. 1895 and 1896, June 21 and 28, 1923, pp. 343-345 and 357-360, 29 figs. Detailed description of different types of engines and their parts; horsepower.

O

OIL ENGINES

Falk. A New Heavy-Oil Engine. Power, vol. 58, no. 2, July 10, 1923, pp. 56-58, 7 figs. Description of Falk 550-hp. solid-injection four-cylinder vertical engine designed for both stationary and marine service; for marine propulsion four engines drive one propeller through reduction gears.

Heat Losses. Losses in Heat Engines and Means of Reducing Them, W. P. Sillince. Petroleum World, vol. 20, no. 274, July 1923, pp. 289-290. Internal-combustion machinery; combined oil and steam plant; principle of the Still engine; starting and running on steam. Abstract of paper before Diesel Engine Users Assn.

OIL FUEL

Cracking. The Cracking of Venezuela Fuel Oil, Gustav Egloff. Petroleum World, vol. 20, no. 274, July 1923, pp. 285-286. Results already obtained and possibilities of the future.

OILS

Castor Oil, Hydrogenation of. Catalytic Hydrogenation of Castor Oil and Its Derivatives (Hydrogénation catalytique de l'huile de ricin et de ses dérivés—Déshydrogéantion de l'hydro-huile), André Brochet. Société Chimique de France—Bul., vol. 33-34, no. 5, May 1923, pp. 626-632. Details of experiments, catalyzers used, quantity of hydrogen absorbed, etc.

Marine-Animal. Marine-Animal Oils (Les Huiles d'animaux marins), Emile Andre. Société Chimique de France—Bul., vol. 33-34, no. 5, May 1923, pp. 469-506. Chemistry of marine-animal oils; discusses fatty acids, unsaponifiable matter, glycols, etc.; production and use.

Mechanical Handling of. Mechanical Handling of Oils (La manipulation automatique des hydrocarbures), M. Carbonaro. Société des Ingenieurs Civils de France—Procès-Verbal, no. 11, May 25, 1923 pp. 396-408. Oil stations organized as storage places; automobile and aviation service; pumping, measuring and distribution of oil; handling; etc.

Testing. Testing Steam-Cylinder Oils, W. F. Osborne. Mech. World, vol. 73, no. 1903, June 22, 1923, pp. 391-392. Factors entering into comparative tests of two cylinder oils, to determine which is more suitable for engineer's local conditions.

OPEN-HEARTH FURNACES

Basic Process. Contribution to Metallurgy of Basic Open-Hearth Process and to Question of Influence of Oxygen Content on Mechanical Properties of Low-Carbon Steel, With Special Reference to Red-Shortness (Beitrag zur Metallurgie des basischen Martinverfahrens und zur Frage des Einflusses des Sauerstoffgehaltes auf die mechanischen Eigenschaften des Flusseisens, insbesondere des Rotbruches), Herbert Mondon. Stahl u. Eisen, vol. 43, nos. 23 and 24, June 7 and 14, 1923, pp. 745-752 and 782-788, 16 figs. Melting tests; results of physical, chemical and metallographic investigations; behavior of oxygen.

Reversing Valves. Air and Gas Reversing Valves, W. Trinks. Fuels & Furnaces, vol. 1, no. 3, July 1923, pp. 153-156, 1 fig. Effect of type of reversing valves on design and operation of regenerative furnaces with particular reference to open-hearth furnaces.

OVENS

Drying. Fuels and Their Handicaps as Related to Drying Ovens, H. M. Lane. Fuels & Furnaces, vol. 1, no. 1, May 1923, pp. 4-5. Considers electricity, gases, oil, coal, and coke. Latter is most economical.

OXY-ACETYLENE CUTTING

Advantages and Applications. Oxy-acetylene Process of Cutting Metals. Machy. (N. Y.), vol. 29, no. 11, July 1923, pp. 857-859, 3 figs. Advantages of process and modern applications.

OXY-ACETYLENE WELDING

Pipe Lines. Oxy-Acetylene Welding of Oil Carrying Pipe Lines. Acetylene Jl., vol. 25, no. 1, July 1923, pp. 20 and 24-25, 8 figs. Essentially a continuous length without joints and will withstand severe strain. Expansion and contraction compensated for by slack in line.

Water Wheels. Service Engineer Shows Value of Welding Process. Can. Machy., vol. 29, no. 23, June 7, 1923, pp. 39-40, 2 figs. Building up worn ridges on webs of large bronze water wheels; secret of success lay in proper preheating.

OXYGEN

Industrial. Research Work on Industrial Oxygen, T. Campbell Finlayson. Chem. Age (Lond.), vol. 8, no. 209, June 16, 1923, pp. 642-643 and (discussion) 643-645. Results of research work instituted with object of finding some simple process which would produce oxygen at a price not exceeding one shilling

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 136

DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
Lammert & Mann Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* Cleveland Worm & Gear Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Poole Engrg. & Mch. Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Fuller-Lehigh Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co.

Steel, Cold Rolled
Cumberland Steel Co.
* Union Drawn Steel Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Falk Corporation
* Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
* Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Keeler, E. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Stokers, Chain Grate
* Babcock & Wilcox Co.
Combustion Engineering Corp'n
Green Engineering Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Overfeed
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
(Richardson-Phenix Division)

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Switches, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Synchronous Converters
(See Converters, Synchronous)

Synchroscopes
Weston Electrical Instrument Co.

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.

Tachometers
* Bristol Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Tachoscopes
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Tanks, Acid
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
* Graver Corp'n
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Green Engineering Co.
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Machinery
* Franklin Machine Co.

Thermometers
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
Taylor Instrument Cos.

Thermometers, Distance
Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.

Thermostats
* Bristol Co.
* Fulton Co.
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co. (Inc.)

Tie Tamping Outfits
* Ingersoll-Rand Co.

Time Recorders
* Bristol Co.

Tipples, Steel
Link-Belt Co.

Tongs, Crane
Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Machinists' Small
* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
DuPont Engineering Co.

Torches, Hand
* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tractors, Industrial (Storage Battery)
Yale & Towne Mfg. Co.

Tractors, Turntable
Whiting Corp'n

Trailers, Industrial
Yale & Towne Mfg. Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
Whiting Corp'n

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Transmissions, Variable Speed
American Fluid Motors Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* Crane Co.
* Sarco Co. (Inc.)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Treads, Stair (Rubber)
United States Rubber Co.

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n
Whiting Corp'n

Trucks, Industrial (Storage Battery)
Yale & Towne Mfg. Co.

Trucks, Trailer
Yale & Towne Mfg. Co.

Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.

Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Tubing, Rubber (Hard)
* Goodrich, B. F. Rubber Co.

Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mch. Co.
Whiting Corp'n

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy. Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Elec. & Mfg. Co.

Turbo-Blowers
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.

Turbo-Compressors
* Ingersoll-Rand Co.

Turbo-Generators
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Terry Steam Turbine Co.
* Westinghouse Electric & Mfg. Co.

Turbo-Pumps
* Kerr Turbine Co.
Midwest Engine Corp'n
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

Turntables
Link-Belt Co.
Northern Engineering Works
Whiting Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

per 1000 cu. ft. and would involve low capital expenditure; details of apparatus. Abstract of paper read before Instn. Chem. Engrs.

Liquid. Liquid Oxygen As an Explosive (El oxigeno Liquido usado como explosivo), Angel Peimbert. Revista Mexicana de Ingeniería y Arquitectura, vol. 1, no. 4, June 15, 1923, pp. 177–192, 5 figs. Its production, and machinery used; application of liquid oxygen in Mexican Mines for blasting; its advantages.

P

PAINTS

Accelerated Weathering. Recent Progress of Investigations on Accelerated Weathering of Paints and Varnishes, H. A. Nelson. Paint Mfrs. Assn. of U. S., Sci. Section, Circular 184, June 1923, pp. 294–299, 6 figs. Results of previous work, recent additions to equipment, exposure cycle; typical exposure results.

Titanium White. Titanium White (Le blanc de titane), H. Rabate. Revue Industrielle, vol. 53, no. 20, June 1923, pp. 197–206, 11 figs. White pigments used in paint industry; history of titanium, its production, and use as white pigment, physical and chemical properties.

Titanox Paints, I. D. Hagar. Paint Mfrs. Assn. of U. S., Sci. Section, Circular 184, June 1923, pp. 287–290. Development of opaque white pigment from black crystalline ores of titanium, ilmenite, and rutile.

PEAT

Utilization. Peat (Vildomoserne). Ingeniören, vol. 32, no. 17, Apr. 28, 1923, pp. 193–201, 6 figs. Opinions of K. Prytz, J. Munch-Petersen, and V. Faaborg-Andersen. Utilization of peat; occurrence in Denmark; report of peat commission as to production and utilization of peat.

PISTON RINGS

Machining. Machining "V-plex" Piston-rings, Edward K. Hammond. Machy. (N. Y.), vol. 29, no. 11, July 1923, pp. 865–868, 10 figs. Leak-proof automotive piston ring and tools and methods used in its manufacture.

PISTONS

Aluminum. Production of Aluminum Pistons and Casings (Herstellung von Aluminium Gusskolben und -gehäusen), K. Kerpely. Giesserei Zeitung, vol. 20, no. 12, May 15, 1923, pp. 222–225, 13 figs. Discusses aluminum and its alloys; properties of aluminum pistons; methods of production.

Design. Light Alloys Play Prominent Part in Recent Piston Design Development. Automotive Industries, vol. 48, no. 26, June 28, 1923, pp. 1381–1391, 26 figs. Mechanical drawings showing recent developments in pistons.

Pins. Rickenbacker Adopts Lapping Process on Piston Pin Bearing Surfaces, J. Edward Schipper. Automotive Industries, vol. 49, no. 1, July 5, 1923, pp. 22–24, 6 figs. Describes lapping process used by Rickenbacker Motor Co. to reduce usual irregularities in piston-pin and piston-ring bearing surfaces.

POWER GENERATION

Automatic Plants. Economies Effected by Installation of Automatic Generating Plants, R. C. Denny. Jl. Electricity & West. Ind., vol. 50, no. 11, June 1, 1923, pp. 435–438, 4 figs. Plants in operation in California. Report of Sub-Committee on Automatic Generating Stations of Apparatus Committee before Pacific Coast Elec. Assn.

POWER PLANTS

Arctic Machine Company. Power Plant of the Arctic Ice Machine Co.; L. E. Pollard. Southern Engr., vol. 39, no. 4, June 1923, pp. 35–44, 9 figs. How an old plant was remodeled to bring it up-to-date; main features and arrangement of various apparatus.

Wind-Driven. Wind Power Plants (Om Vindkraftenlaeg), I. E. Johansen. Teknisk Tidsskrift (Tekniske Forenings), vol. 47, no. 3, Jan. 31, 1923, pp. 15–20, 4 figs. Utilization of wind by windmills and sailing ships; details of construction of a new wind motor.

POWER TRANSMISSION

Belt Drive. See BELT DRIVE.

Radioelectric. Radioelectric Transmission of Energy (La transmission radioelectrique de l'énergie), Maurice Leblanc. Radioelectricité, vol. 4, no. 6, June 1, 1923, pp. 181–184, 5 figs. Discusses transmission of energy (a) over short distances, and its application to traction of trains, automobiles, etc. and (b) over great distances, and difficulties involved.

Types of Drives. Power Transmission in Southern Industries. Southern Engr., vol. 39, no. 4, June 1923, pp. 35–60, 74 figs. Discusses rope-drive transmission; leather and rubber belting; chain drives; speed variation; shafting, pulleys, couplings, and clutches; plain, roller and ball bearings; shaft hangers with concrete construction; electric motors in industry.

PRODUCER GAS

Hydrogen Determination. Determination of Hydrogen in Generator Gas (Ueber die Bestimmung des Wasserstoffes im Generatorgas), Wilhelm. Feuerungstechnik, vol. 11, no. 16, May 15, 1923, pp. 171–173, 3 figs. Production of generator gas; describes new H_2 meter, and arrangement of measuring instruments for generator gas.

PULVERIZED COAL

Boiler Firing with. Pulverized Coal, E. H. Tenney. Combustion, vol. 9, no. 1, July 1923, pp. 55–73, 9 figs. Report from Nat. Elec. Light Assn. Prime Movers Committee report. Statements received from companies operating pulverized-fuel-fired boilers, showing increased application of pulverized fuel, and its advantages.

Pulverized Fuel for Power Plants, A. G. Christie. Gas Age-Rec., vol. 51, no. 25, June 23, 1923, pp. 791–792. Discussion presented before Prime Movers Committee of N. E. L. A., showing that choice between stokers and powdered fuel depends upon conditions of problem; comparative advantages of stoker and pulverized-fuel equipment.

Fineness of. Powdered Coal, F. S. Sinnatt and L. Slater. Fuel in Sci. & Practice, vol. 2, nos. 5 and 6, June and July, 1923, pp. 142–146 and 175–181, 2 figs. June: Deals with question of determining degree of fineness of powdered coal, produced by pulverizing in ball mill, and shows that sieving tests cannot give complete information. July: Methods for determining size of particles in a powder; sizing by microscopic examination; comparison of different coals.

Smelting-Furnace Firing. Advantages of Pulverizing Coal for Firing Smelting Furnaces, Etc. Salt Lake Min. Rev., vol. 25, no. 5, June 15, 1923, pp. 19–20. Crushing and firing advantages; drawbacks to use of pulverized coal.

Will Pulverized Coal Be Substituted for Fuel Oil in Smelting Operations? T. H. O'Brien. Coal Age, vol. 23, no. 25, June 21, 1923, pp. 1013–1014. Freight rates and number of heat units big factor in comparing fuels; pulverized coal has higher thermal efficiency than mine-run; cheap electrical power from water-power developments may compete with fuel oil and coal.

PUMPING PLANTS

St. Thomas, Ont. Water Works Pumping Station, St. Thomas, W. C. Miller. Can. Engr., vol. 45, no. 1, July 3, 1923, pp. 101–103, 4 figs. Main and standby plants each have a capacity of 5,600,000 gal. per day against 125 lb. head; three motor-driven 2-stage centrifugal pumps and three 8-cylinder gasoline-engine-driven 2-stage centrifugal pumps.

PUMPS

Reciprocating, Specifications for. Pumps, Reciprocating, for Liquids. Abridgments of Specifications, Class 102 (i), 1909–15, 322 pp. Includes steam-engine air-pumps and combined pumps for liquids and gases.

PUMPS, CENTRIFUGAL

Design. Centrifugal Pump Problems, George Higgins. Commonwealth Engr., vol. 10, no. 9, Apr. 1, 1923, pp. 341–351, 8 figs. Describes tests carried on at hydraulic laboratory of University of Melbourne to obtain information as aid in designing simple centrifugal pumps.

Electric Drive for. Electric Drive for Centrifugal Pumps (La commande électrique des pompes centrifuges), M. Bizot. Electricien, vol. 54, no. 1325, June 1, 1923, pp. 241–246, 10 figs. Construction and operation of centrifugal pumps; application of electric drive; pumps direct-coupled to induction motors; automatic control devices.

PYROMETERS

Application in Malleable Foundries. Application of Electric Pyrometers in Malleable Foundries (Verwendung elektrischer Pyrometer in Tempergiessereien), A. Ruoff. Werkstattstechnik, vol. 17, no. 11, June 1, 1923, pp. 328–330, 8 figs. Describes pyrometer manufactured by Hydro Apparate-Bauanstalt, and its application in medium-size malleable foundries, resulting in considerable saving of coal.

Ardometer. The Ardometer—A New Radiation Pyrometer for the Measurement of High Temperatures, D. Flir. Fuels & Furnaces, vol. 1, nos. 1 and 2, May and June 1923, pp. 17–20 and 94–96, 8 figs. Describes instrument and gives its special advantages.

Use. Data on Pyrometers. Fuels & Furnaces, vol. 1, no. 3, July 1923, pp. 183–184, 2 figs. Review of Bull. no. 37 of Heat Economy Bur. of German Iron & Steel Inst. (Verein Deutschen Eisenhüttenleute) containing large number of data on use of pyrometers. Designs for measuring fluctuating temperatures; temperature at which various protecting tubes may be used and their properties.

R

RAILWAY CONSTRUCTION

N. Y. Central, N. Y. Rapid Progress Being Made on Castleton Cut-Off. Ry. Age, vol. 74, no. 30, June 30, 1923, pp. 1681–1686, 13 figs. Work on new New York Central line to relieve congestion at Albany; bridge structure is about one mile in length; heavy construction on east side of river; unusual culvert-construction problem.

RAILWAY ELECTRIFICATION

Financial Investigation. Financial Investigation of the Prospects of Railway Electrification, Philip Dawson. Inst. Transport—Jl., vol. 4, no. 8, June 1923, pp. 279–286 and (discussion) 286–296, 17 figs. on pp. 297–303. Results of investigation are presented in set of diagrams, and discussed; increase in in train service due to electrification. Main lines electrified or in course of electrification in Europe and United States of America.

France. Electrification of Local Railways in the Jura (Project d'électrification des chemins de fer d'intérêt local du Jura). Industrie Electrique, vol. 32, no. 743, June 10, 1923, pp. 208–210. Comparative cost of steam, oil and electric traction, showing that electric is most economical, even for small traffic.

Some Advantages of Railway Electrification for Developing Power Distribution in France (Quelques-uns des avantages de l'électrification des Chemins de Fer pour le développement des distributions d'énergie en France), C. Lavanchy. Industrie des Tramways, Chemins de Fer et Transports Publics Automobiles, vol. 17, no. 197, May 1923, pp. 166–172, 5 figs. Railway electrification pending and under way; development of necessary high-tension power transmission to supply current for railways, and its advantages in providing current at same time for industrial purposes, thus aiding development of industries; linking-up of power units; etc.

South Africa. The Electrification of the Natal Railways. So. African Mining & Eng. Jl., vol. 34, no. 1651, May 19, 1923, pp. 281–283. Electrification of section of South African Railways in Natal between Pietermaritzburg and Glencoe Junction; notes on power station, power-station buildings, boiler-house and -engine-room equipment, switchhouse, coal- and ash-handling plant, step-up and traction substations, transmission lines, track equipment and locomotives. From So. African Rys. & Harbor Mag.

South America. Railway Electrification in South America. Tramway & Ry. World, vol. 53, no. 29, June 14, 1923, pp. 281–287, 9 figs. Inauguration of electric traction on suburban lines of Buenos Aires West. Ry. power station, boiler-house plant, coal and ash-handling plant, engine room, and condensing plant.

Virginia. The Virginian Electrification, R. L. McClellan. Aera, vol. 11, no. 12, July 1923, pp. 1660–1663, 4 figs. Railroad to be made to permit hauling of heavier trains at higher speed and less ton-mile cost than heretofore has been possible.

RAILWAY EQUIPMENT

Maintenance. Maintenance Methods used by the New Haven, H. T. Morris. Ry. Elec. Engr., vol. 14, no. 6, June 1923, pp. 163–166, 9 figs. A system of periodic inspection of all multiple-unit cars on N. Y., N. H. & H. RR. keeps equipment in prime condition.

RAILWAY MANAGEMENT

Organization. Organization for Conducting the Business of the Southern Railway Company (England). Ry. Gaz., vol. 38, no. 24, June 15, 1923, pp. 881–887. Regulations for conducting business of board and committees; departmental organization defining duties, powers and responsibilities of officers.

RAILWAY MOTOR CARS

Benzol. Benzol Railway Motor Cars (Benzol-mechanische Eisenbahn-Triebwagen). Verkehrstechnik, vol. 40, no. 21, May 25, 1923, pp. 180–182, 4 figs. Energy of internal-combustion engine is transmitted direct mechanically with high efficiency; details of design and construction; manufactured by Deutsche Werke A. G.

Development. The Development of the Self-Propelled Railway Car, Charles J. McPherson. Engrs. & Eng., vol. 40, no. 5, May 1923, pp. 133–138, 9 figs. Details of various types.

Storage-Battery. Storage Battery Cars on the Canadian National, E. B. Walker. Ry. Elec. Engr., vol. 14, no. 6, June 1923, pp. 175–179, 6 figs. Construction of cars; battery charging and maintenance; operation data.

RAILWAY OPERATION

Train Control. Automatic Train Control Developments. Ry. Elec. Engr., vol. 14, no. 6, June 1923, pp. 179–185, 13 figs. Systems employed by Gen. Ry. Signal Co. and Ind. Equipment Corp.

The Braking Phase of Automatic Train Control, W. Gordon Fischer. Ry. Rev., vol. 72, no. 25, June 23, 1923, pp. 1098–1103. Points out that accepted phraseology is practically a misnomer for brakes really and not signals control train. (Abstract.) Paper read before Cincinnati Ry. Club.

RAILWAY REPAIR SHOPS

Economies in. Economies in a Railroad Repair Shop, L. S. Love. Iron Age, vol. 112, no. 1, July 5, 1923, pp. 1–4, 13 figs. Using special testing appliances; reclaiming worn steel and tools; acetylene-welding equipment; cost-keeping machines employed.

Waco, Tex. Modern Locomotive Repair Shop at Waco, Texas. Ry. Rev., vol. 73, no. 1, July 7, 1923, pp. 1–6, 8 figs. Description of shop of transverse type, built by Missouri-Kansas-Texas R.R.

RAILWAY SHOPS

Germany. Reorganization of German Railway Shops (Die Neuordnung der Reichsbahnwerkstätten), Hans Haase. Archiv für Eisenbahnwesen, no. 3, May-June 1923, pp. 373–410. Results of new organization and regulations put in force three years ago; calculation of cost of production and of net earnings, double-entry bookkeeping, etc.

Locomotive, Czechoslovakia. Notes on Shop Practice in Czecho Slovakia, Leonid W. Filippoff. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 1037–1039, 6 figs. The Skoda locomotive works.

Small Back. Increasing the Output of Small Back Shops. Ry. Rev., vol. 72, no. 24, June 16, 1923, pp. 1033–1037, 4 figs. Production methods of small shop.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 136

Unions
* Crane Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Unloaders, Car
Link-Belt Co.

Vacuum Dryers, Pans, Pumps, Traps, etc.
(See Pans, Pumps, Traps, etc., Vacuum)

Valve Discs
* Edward Valve & Mfg. Co.
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
United States Rubber Co.

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Fulton Co.
* Jenkins Bros.
* Simplex Valve & Meter Co.
* Smith, H. B. Co.

Valves, Air, Relief
* Fulton Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.

Valves, Altitude
* Simplex Valve & Meter Co.

Valves, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Valves, Back Pressure
* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
* Crane Co.
* Davis, G. M. Regulator Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co.

Valves, Blow-off
* Ashton Valve Co.
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
Elliott Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Butterfly
* Chapman Valve Mfg. Co.
* Crane Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.

Valves, Check
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Valves, Electrically Operated
* Chapman Valve Mfg. Co.
* Dean, Payne (Ltd.)
* General Electric Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Exhaust Relief
* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H.S.B.W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.

Valves, Float
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division
* Schutte & Koerting Co.
* Simplex Valve & Meter Co.

Valves, Foot
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Worthington Pump & Machy. Corp'n

Valves, Gate
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Globe, Angle and Cross
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Vogt, Henry Machine Co.

Valves, Hose
* Chapman Valve Mfg. Co.
* Crane Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Hydraulic
* Chapman Valve Mfg. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Hydraulic Operating
* Chapman Valve Mfg. Co.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Non-Return
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Plug
* Chapman Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Pop Safety
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Pump
* Bowser, S. F. & Co. (Inc). (Richardson-Phenix Division)
* Goulds Mfg. Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Nordberg Mfg. Co.
United States Rubber Co.

Valves, Radiator
* American Radiator Co.
* Crane Co.
* Dean Payne (Ltd.)
* Fulton Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Valves, Radiator, Packless
* American Radiator Co.
* Fulton Co.

Valves, Reducing
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
Elliott Co.
* Fulton Co.
* Kieley & Mueller (Inc.)

Valves, Regulating
* Crane Co.
* Davis, G. M. Regulator Co.
* Dean, Payne (Ltd.)
* Edward Valve & Mfg. Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Simplex Valve & Meter Co.

Valves, Relief (Water)
* Ashton Valve Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Safety
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Valves, Stop & Check
(See Valves, Non-Return)

Valves, Superheated Steam (Steel)
* Bowser, S. F. & Co. (Inc.) (Richardson-Phenix Division)
* Chapman Valve Mfg. Co.
* Crane Co.
* Edward Valve & Mfg. Co.
* Jenkins Bros.
Kennedy Valve Mfg. Co.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Valves, Thermostatically Operated
* Dean, Payne (Ltd.)
* Fulton Co.

Valves, Throttle
* Crane Co.
* Hooven, Owens, Renstchler Co.
* Jenkins Bros.
* Lunkenheimer Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.

Ventilating Systems
* American Blower Co.
Clarage Fan Co.

Voltmeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Vulcanizers
* Bigelow Co.
New Haven Boiler Works (Inc.)

Wash Bowls
Manufacturing Equipment & Engrg. Co.

Washers, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Water Columns
* Ashton Valve Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Water Purifying Plants
* Graver Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Water Softeners
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
International Filter Co.
* Permutit Co.
* Scaife, Wm. B. & Sons Co.
Wayne Tank & Pump Co.

Water Wheels
(See Turbines, Hydraulic)

Waterbacks, Furnace
Green Engineering Co.

Waterproofing Materials
* Johns-Manville (Inc.)
Texas Co.

Wattmeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Welding and Cutting Work
Linde Air Products Co.

Welding Equipment, Electric
* General Electric Co.

Wheels, Car
* Fuller-Lehigh Co.

Wheels, Polishing Paper
Rockwood Mfg. Co.

Whistles, Steam
* Ashton Valve Co.
Brown, A. & F. Co.
* Crane Co.
* Crosby Steam Gage & Valve Co.
* Lunkenheimer Co.
* Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division

Winches
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.

Wire, All Metals
Driver-Harris Co.

Wire, Brass and Copper
* Roebling's, John A. Sons Co.

Wire, Flat
* Roebling's, John A. Sons Co.

Wire, Iron and Steel
* Roebling's, John A. Sons Co.

Wire and Cables, Electrical
* General Electric Co.
* Roebling's, John A. Sons Co.
United States Rubber Co.

Wire Mechanism (Bowden Wire)
* Gwilliam Co.

Wire Rope
(See Rope, Wire)

Wire Rope Fastenings
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Wire Rope Slings
* Roebling's, John A. Sons Co.

Wiring Devices
* General Electric Co.

Worm Gear Drives
* Cleveland Worm & Gear Co.
* Foote Bros. Gear & Mach. Co.
Hindley Gear Co.
* James, D. O. Mfg. Co.
* Jones, W. A., Fdy. & Mach. Co.
Link-Belt Co.

Wrenches
* Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

RAILWAY SIGNALING

New South Wales. Railway Signaling in New South Wales. Indus. Australian & Min. Standard, vol. 69, no. 1799, May 24, 1923, pp. 838–839, 3 figs. Particulars of the various systems of working in use; power; electric and automatic signaling; approach locking; automatic crossing loops on single lines; locomotive cab signaling and automatic train control.

RAILWAY STATIONS

Ticket Printer, Electric. Electric Railway Ticket Printer (Siemens-Schalter-Fahrkartendrucker). Siemens-Zeit., vol. 3, no. 5, May 1923, pp. 197–205, 14 figs. Describes fully automatic, electrically driven machine which prints railway tickets at instant of demand.

RAILWAY TIES

Maintenance. Tie Renewals, J. E. Jacobs. Eng. & Contracting (Railways), vol. 59, no. 6, June 20, 1923, pp. 1363–1364. Practical suggestions on use and handling of ties given in paper before Maintenance of Way Assn. of Kansas City Southern Ry.

RAILWAY TRACK

Maintenance. Track Maintenance in City Streets, W. D. Chamberlain. Pacific Ry. Club-Proc., vol. 7, no. 1, Apr. 1923, pp. 21–30. Importance of good organization of force required for track maintenance and construction; reconstruction methods; equipment; joints and paving.

Use of Compressed Air in Track Maintenance and Construction, W. H. Armstrong. New England R. R. Club—Proc., May 8, 1923, pp. 95–105 and (discussion) 105–111. Description of pneumatic tie tamper and its application to track construction and maintenance; stone ballast.

RAILWAYS

Aerial. Extra-Rapid Aerial Railways (Chemins de fer aériens extra-rapides), R. Dumé. Electricien, vol. 39, no. 1326, June 15, 1923, pp. 270–271, 2 figs. Describes Paris project, an aerial flying express consisting of airship running under cableway, propelled like airplanes, reaching speed of 250 km.p.h.; projected by F. Laur.

Baroda. The Baroda State Railways, C. C. Sheth. Ry. Gaz., vol. 38, no. 23, June 8, 1923, pp. 854–856, 2 figs. History of development.

France. French Railways and Railway Practice, W. T. Richards. Pacific Ry. Club—Proc., vol. 7, no. 1, Apr. 1923, pp. 5, 7, 9 and 11. General review of railway situation in France since war, including fuel problems, electrification progress, and construction work.

Morocco. The Transsaharan Railway (Le Transsaharien). Ed. du Vivuer de Streel. Société Industrielle de l'Est—Bul., no. 168, Jan.–Mar. 1923, pp. 51–63, 1 fig. Discusses various projects for railway crossing the desert, and necessity of such a railway as basis for economic development.

REFRACTORIES

Glass-Manufacturing Furnaces. Refractories for the Glasshouse, J. L. Crawford. Fuels & Furnaces, vol. 1, no. 2, June 1923, pp. 73–76. Demands made on refractories in crown, side walls and ports of glass tank furnaces and materials best meeting same.

Mortar for. Requirements of a Refractory Mortar, Robert F. Lindsay. Fuels & Furnaces, vol. 1, no. 1, May 1923, pp. 14–16. Specifications of a refractory mortar, or bonding material, to be used within temperature range of a No. 1 firebrick.

REFRIGERATING MACHINES

Compression, Superheater Heat Utilization in. Utilizing Superheater Heat in Compression Refrigerating Machines (Die Nutzbarmachung der Ueberhitzungswarme bei Kompressionskältemaschinen), Edmund Altenkirch. Zeit. fur die gesamte Kalte-Industrie, vol. 30, no. 5, May 1923, pp. 57–59, 2 figs. Suction of vapors in dry saturated state and condensing adiabetically is considered as most practical; its disadvantages and efforts to overcome them.

RELATIVITY

Einstein's Theory. Einstein's Theory of Relativity and Gravitation, L. T. Rutledge. Eng. Jl., vol. 6, no. 7, July 1923, pp. 341–342. Philosophy of relativity; time and space and mechanical principle of relativity; special and general theory; applications.

Model to Illustrate. Model to Illustrate Theory of Relativity. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 7, July 1923, p. 712. Device which directly conveys to the eye, principal statements and results of Einstein's original (restricted) theory of relativity, recently perfected by Prof. Karapetoff.

RESEARCH

Extension of. The Extension of Experimental Methods, A. S. Townsend. Forging & Heat Treating, vol. 9, no. 6, June 1923, pp. 250–253. Need for specific information in creative thought and originality is strongly emphasized; a clear understanding of how to experiment is essential.

RIFLES

Autoloading. The Garand Autoloading Rifle, R. C. Coupland. Army Ordnance, vol. 3, no. 18, May-June, 1923, pp. 321–323, 3 figs. Simplicity of design, accuracy and precision of operation and other features claimed for this rifle.

RIVETING

Machines for. A New Semi-Hot Bolt and Rivet Header. Forging & Heat Treating, vol. 9, no. 6, June 1923, pp. 257–259, 3 figs. Describes semi-hot automatic-feed rivet and bolt header, weighing 31,500 lb., which eliminates unnecessary shutdowns for adjustments, materially increasing production; life of gripping dies increased by reducing holding time.

ROLLING MILLS

Broad-Flanged Beams. Rolling Broad-Flanged Beams at Differdingen, K. Raabe. Iron & Coal Trades Rev., vol. 106, no. 2884, June 8, 1923, pp. 860–861, 7 figs. Describes Differdingen Grey mill for rolling broad-flanged beams; plant consists of blooming mill, intermediate mill, and finishing mill. Translated from Stahl u. Eisen.

Rolling Processes. Processes for Rolling Metal (Die Nutzarbeit des Walzvorganges), L. Weiss. Zeit. für Metallkunde, vol. 15, no. 5, May 1923, pp. 133–136, 5 figs. Magnitude of volume displaced in rolling and effect of speed of transformation on interior friction; resistance caused by high pressure of flow; apparant and real pressure of flow; curves.

Rolls, Cast-Steel. Production of Cast Steel Rolls for Rolling Mills (La fabrication des cylindres de laminoirs en acier moulé), A. Lang. Fonderie Moderne, vol. 17, June 1923, pp. 182–186, 3 figs. Discusses iron and steel cast rolls, their advantages and drawbacks; molding; cracks and how to avoid them; annealing; faults.

Sheet Mills. New Merchant Mill of Tennessee Co. Iron Age, vol. 112, no. 3, July 19, 1923, pp. 142–145, 5 figs. Describes merchant mill at Fairfield steel works of Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.; continuous and looping trains, cooling beds, continuous furnace and roll racks are features.

RUBBER INDUSTRY

United States. The Rubber Industry. U. S. Bur. of Census, Census of Manufacturers, 1921, 24 pp. General statistics, statistics of wage earners, production, imports and exports.

S

SAFETY

Industrial. Industrial Safety. Int. Labour Rev., vol. 7, no. 6, June 1923, pp. 948–958. Mental causes of accidents; the Safety-First Movement in United States, Great Britain, and Belgium.

SAND

Grinding. Grinding of Sand. Times Trade & Eng. Supp., vol. 12, no. 257, June 9, 1923, p. 301, 1 fig. Law of comminution formulated as result of experimental work by British Portland Cement Research Assn.

SAND, MOLDING

Bond Testing. Give Details of Bonding Test. Foundry, vol. 51, no. 13, July 1, 1923, pp. 545–547, 7 figs. Details of method of testing sand for bond; strength of bond is determined by carefully adhering to method thoroughly worked out to give concordant results; moisture of sand is an important factor. Report presented at Am. Foundrymen's Assn. convention.

Composition and Properties. The Second Melting Foundry (Etude sur la fonderie de deuxieme fusion), P. Vernier. Arts & Métiers, vol. 76, no. 31, Apr. 19, 1923, pp. 539–545, 3 figs. Discusses foundry sands, their composition and properties, microscopic study, proper selection, etc.

Permeability. The Permeability of Foundry Sand. Brass World, vol. 19, no. 6, June 1923, pp. 177–179, 4 figs. Describes new French method for determining permeability, developed by Georges-Louis Borne; explains its everyday application.

Properties. Moulding Sands, O. Smalley. Foundry Trade Jl., vol. 27, nos. 354 and 355, May 31 and June 7, 1923, pp. 435–438 and 457–459, 2 figs. Specification for molding sand; core sand; method of determining degree of fineness; testing; properties of various sands.

SEAPLANES

Caspar Sport. The Caspar Sport Seaplane. Flight, vol. 15, no. 24, June 14, 1923, pp. 315–316, 6 figs. 2-seater seaplane of German design, with 60-hp. Siemens engine; weight empty, 790 lb.; loaded, 1120 lb.; maximum speed, 90 mi. per hr.

SEMI-DIESEL ENGINES

Peugeot-Tartarais. The Peugeot-Tartrais Heavy-Oil Engine (Le moteur à huiles lourdes Peugeot-Tartrais), G. Delanghe. Génie Civil, vol. 82, no. 23, June 9, 1923, pp. 547–552, 8 figs. Semi-Diesel type engine; details of construction and operation.

SEPARATORS

Ash, Magnetic. Development of Dry Magnetic Process for Recovering Fuel from Ashes (Die weitere Entwicklung des trockenmagnetischen Verfahrens zum Rückgewinnen Brennstoffen aus Feuerungsrückständen). Gewerbefleiss, vol. 102, no. 5, May 1923, pp. 124–127, 3 figs. Describes magnetic separators of various types, and their power consumption.

SEWING MACHINES

Manufacture. Operations on the Ideal Sewing Machine, George Hey. Machy. (Lond.), vol. 22, no. 561, June 28, 1923, pp. 413–416, 8 figs. Description of some of the operations on frame.

SHERARDIZING

Coatings, Quality of. Protection by Sherardized Coatings. Metal Industry (Lond.), vol. 22, no. 23, June 8, 1923, pp. 588–589, 4 figs. Data on effect of time and temperature on rate of deposition and quality of coating produced.

SPRINGS

Leaf. Analysis of Tension and Flexure in Leaf Springs (Une analyse des tensions et flexions dans les resorts à lames), D. Landau. Technique Automobile et Aérienne, vol. 14, no. 121, 1923, pp. 33–45, 16 figs. Mathematical analysis of springs of great endurance.

STACKS

Reinforced-Concrete. Recent Reinforced-Concrete Stacks (Zeitgemässe Eisenbetonschornsteine), Paul Frei. Tonindustrie-Zeitung, vol. 47, no. 47, June 13, 1923, pp. 367–369, 2 figs. Resistance to wind pressure; advantages of reinforced-concrete construction; stacks with and without lining; describes different types of construction.

STANDARDIZATION

Austria. Standardization in Austrian Industries (Den östrigske Industris Retningslinjer ved Standardisering), Hans Schuster. Ingeniören, vol. 32, no. 13, Mar. 31, 1923, pp. 149–151. Discusses ÖNIC (Oesterreichischer Normenausschuss für Industrie und Gewerbe) standards, including materials, semi-manufactures and machines.

STEAM-ELECTRIC PLANTS

Lignite-Burning. Lignite Electricity Works (Rohbraunkohle-Elektrizitätswerke). Elektrotechnischer Anzeiger, vol. 40, nos. 88 and 89, June 2 and 5, 1923, pp. 611–612 and 623–624. Saving in cost of production by erecting works near lignite deposits; advocates separate operation of boiler house, machine house and switch house, and gives details of construction and equipment of each.

Weymouth, Mass. Some Engineering Features of the Weymouth Station, I. E. Moultrop and Joseph Pope. Power, vol. 58, no. 2, July 10, 1923, pp. 42–46, 5 figs. Describes selection of steam conditions, high-pressure installation, boiler plant and feedwater heating, and auxiliary drive of new power station of Edison Elec. Illuminating Co. of Boston, now under construction at Weymouth; will have ultimate capacity of about 300,000 kw.; initial main generating equipment will consist of two 32,000-kw. turbines each driving a main 30,000-kw. generator and a 2000-kw. auxiliary generator direct-connected to shaft of main generator. Paper read before A.I.E.E. convention.

STEAM ENGINES

Uniflow. The Watson Vertical Uniflow Steam Engine. Engineering, vol. 115, no. 2998, June 15, 1923, p. 742, 5 figs. Engine developed for driving of ship stokehold fans, but equally suitable for work of other kinds.

STEAM TURBINES

Governors and Valve Gears. Steam-Turbine Governors and Valve Gears—Dashpots, Synchronizing Springs and Pilot Valves, Eustis H. Thompson. Power, vol. 57, no. 26, June 26, 1923, pp. 1018–1020, 3 figs.

STEEL

Corrosion in Sulphuric Acid. The Effect of Velocity on the Corrosion of Steel in Sulphuric Acid, W. G. Whitman, R. P. Russell, C. M. Welling and J. D. Cochrane, Jr. Indus. & Eng. Chem., vol. 15, no. 7, July 1923, pp. 672–676, 4 figs. Corrosion under acids and under natural waters; discusses fundamental equation and its dependence on metal, hydrogen-ion concentration, ferrous-ion concentration, and removal of hydrogen; previous work and present investigation; reasons for decreased gas evolution and for increased oxygen depolarization with increased velocity.

Tramway, Electrical Resistance of. The Electrical Resistance of Tramway Steel. Electricity, vol. 37, no. 1700, June 8, 1923, p. 297. Treats resistance of joints, rail bonds, electrolysis, and prevention of electrolysis.

Drill. Review of Present Status of Drill Steel Breakage and Heat Treatment, Hardness and Heat Treatment of Mine Drill Steel Shanks. Am. Inst. Min. & Met. Engrs.—Trans., no. 1255-M, June 1923, 29 pp., 8 figs. Discussion of paper of Francis B. Foley, Charles Y. Clayton and Henry S. Burnholz, and of Charles Y. Clayton.

Stainless. Stainless Steel and its Engineering App'ications, Harry Brearley. So. African Instn. Engrs.—Jl., vol. 21, no. 10, May 1923, pp. 273–288, 14 figs. Properties and applications of stainless steel.

"Stainless Steel" in the Chemical Industry. Chem. Age (Lond.), vol. 8, no. 207, June 2, 1923, pp. 590–591. Composition, properties, advantages of chromium steels, and disadvantages of stainless steels.

STEEL CASTINGS

Heat-Treatment. Some Notes on the Heat-Treatment of Steel Castings, Francis Wilson. Metal Ind. (Lond.), vol. 22, no. 25, June 22, 1923, pp. 649–650, 3 figs. Change in structure of metal during heat-treatment process; expansion and contraction; regulating changes, eliminating brittleness, etc.

Manufacture. The Manufacture of Steel Castings and Preparation of Sand, F. A. Melmoth. Foundry Trade Jl., vol. 27, no. 357, June 21, 1923, pp. 499–506, 16 figs. Discussion is confined to castings of light and medium weight. Description of various operations involved in production of such castings in large quantities.

The Manufacture of Steel Castings in the United States, Major R. A. Bull. Foundry Trade Jl., vol. 27, no. 356, June 14, 1923, pp. 477–480. Reviews history of industry, gives its general divisions and discusses basic open-hearth and acid open-hearth practices.

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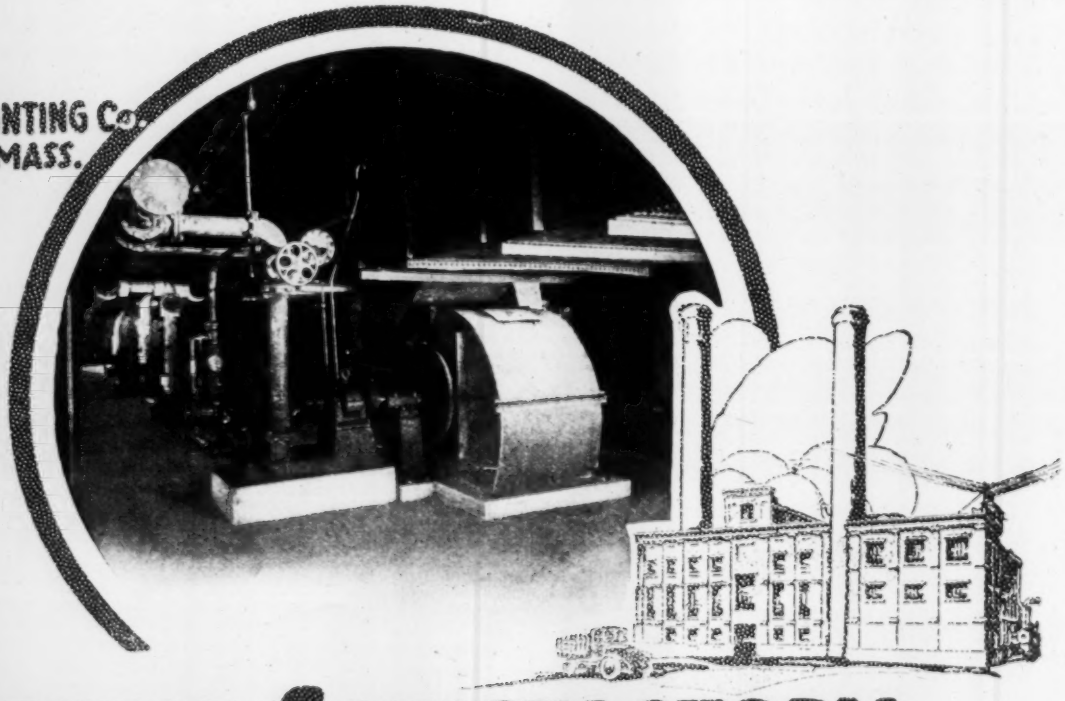

SERVICE SATISFACTORY

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STEEL, HEAT TREATMENT OF

Cyanide Hardening. Facts Worth Knowing About Cyanide Hardening. Can. Machy., vol. 29, no. 25, June 21, 1923, pp. 19 and 24. Temperature and time of heating are important factors; tools heated in this way generally retain their shape and dimensions; lime water or pure cold water for quenching.

Pyrometry in. Heat-treatment of Steel with Special Reference to Production, J. W. Urquhart. Machy. (Lond.), vol. 22, no. 560, June 21, 1923, pp. 367–369. Temperature determination; magnetic detector; electric furnaces and magnetic control; fusible salt detectors; optical methods of heat determination; standard pyrometry; nature of critical range; degrees of heat covering peak of Ac range.

STEEL INDUSTRY

Power and Fuel Consumption. Power and Fuel Consumption of the Iron and Steel Industries of the Pittsburgh District, Summer B. Ely and W. F. Rittman. Mech. Eng., vol. 45, no. 7, July 1923, pp. 401–406, 13 figs. Account of investigation of present power requirements and potential future power possibilities in Pittsburgh district, conducted by Carnegie Inst. of Technology, (1) with relation to community and its development as whole and (2) with relation to various specific industries of community.

STEEL WORKS

England. The Penistone Works of Messrs. Cammell Laird and Company, Limited. Iron & Coal Trades Rev., vol. 106, no. 2886, June 22, 1923, pp. 929–930, 11 figs. partly on pp. 947–950. Description of works, as enlarged during and since war.

South Africa. The Works of the Union Steel Corporation (of South Africa), Ltd., G. Robson. So. African Instn. Engrs.—Jl., vol. 21, no. 10, May 1923, pp. 215–272, 58 figs. Detailed description of works which were begun in 1912 and now covers a total area of fifty acres, situated on the banks of the Vaal River.

STREET RAILWAYS

Cars. Electric Tramway Rolling Stock, W. E. Ireland. Tramway & Ry. World, vol. 53, no. 29, June 14, 1923, pp. 295–304, 18 figs. Fundamental factors which must be considered in making changes in design; double-deck cars and single-deck cars. Paper to be read at Congress of Tramways & Light Assn.

New Philadelphia Cars will have Many Modern Devices. Elec. Ry. Jl., vol. 61, no. 26, June 30, 1923, pp. 1073–1076, 8 figs.—Single-end type is designed for either two-man or one-man operation; all cars to be equipped with safety devices; complete auxiliary equipment; 520 passengers.

Pittsburgh's New "Light Six" Train. Elec. Ry. Jl., vol. 61, no. 22, June 2, 1923, pp. 919–922, 5 figs. Describes new type of two-car train composed of low-floor cars, developed by Pittsburgh Rys.; two motors on trailer, arranged for forward motion only and without separate controller; emergency braking.

Remodeling Obsolete Cars for One-Man Operation. Elec. Ry. Jl., vol. 61, no. 24, June 16, 1923, pp. 996–998, 5 figs. Rehabilitation program of Lehigh Valley Transit Co., Allentown, Pa., includes reconstruction and remodeling of obsolete single-truck cars for one-man operation; several new features have been worked out in connection with control and fare collection systems.

Equipment of I. & C. T. Co. Economics of I. & C. Re-equipment. Elec. Ry. Jl., vol. 61, no. 22, June 2, 1923, pp. 913–917, 1 fig. Indianapolis & Cincinnati Traction Co. to be changed over to d. c. operation; improved car designs and progress in automatic substation development major factors in justifying change.

Trailers. Three-Door Trailers in Toronto. Elec. Ry. Jl., vol. 61, no. 25, June 23, 1923, pp. 1033–1034, 3 figs. Trailers are attached to Peter Witt motor cars, are operated on pay-as-you-pass plan, and have three doors, of which one can be changed by conductor from entrance to exit, as traffic demands.

STREET RAILWAYS, TRACK

Relaying. Relaying Street Railway Tracks and Maintaining Traffic Operation (Die Gleiserneuerung der Strassenbahnen unter Berucksichtigung der Aufrechterhaltung des Betriebes), H. Sober. Verkehrstechnik, vol. 40, nos. 21 and 22, May 25 and June 1, 1923, pp. 177–179 and 187–189, 10 figs. Relaying operations of single and double tracks (a) with interrupted traffic (b) with uninterrupted traffic, and (c) during intervals when cars are not running.

STRUCTURAL STEEL

Buildings. Structural Steel for Buildings. Eng. & Contracting (Buildings), vol. 59, no. 6, June 27, 1923, pp. 1450–1454. Practice adopted by Am. Inst. Steel Construction for design, fabrication, and erection.

Construction Specifications. Cheaper Steel Construction is Objective of A. I. S. C. Can. Engr., vol. 44, no. 26, June 26, 1923, pp. 615–618, 3 figs. Proposed new specification for steel construction formulated by Technical Committee of Assn. of Fabricating Companies; working stresses increased; Rankine column formula; new stiffener spacing rule; derivation and defence of formulas.

Standards. Rolled Steel Sections (British Standard Dimensions and Properties). British Eng. Standards Assn., no. 6, May 1923, 71 pp. Tables for equal angles, unequal angles, bulb angles, bulb plates, channels, beams, tee bars, and metric equivalents for same.

SUPERHEATED STEAM

Economy of. The Economy of Superheater Steam. Indus. Management (Lond.), vol. 9, no. 12, June 14, 1923, pp. 365–366, 2 figs. Points out that superheaters give theoretical saving of approximately 15 per cent, and actual saving of from 5 to 12 per cent of fuel burned.

T

TAYLOR SYSTEM

Building Industry. Of What Value Is the Application of the Taylor System to Labor Efficiency in the Building Industry? (Welchen Wert hat die Anwendung des Taylor-Systems auf die Arbeitsleistungen in Baugewerbe?), H. Agatz. Bauingenieur, vol. 4, no. 8, Apr. 30, 1923, pp. 231–233. How Taylor system can be applied to advantage in building industry.

TERMINALS, RAILWAY

Cordoba, Argentina. New Station at Cordoba, Central Argentine Railway. Ry. Gaz., vol. 38, no. 24, June 15, 1923, pp. 876–879, 10 figs. Details of facilities, general equipment, and type of construction.

TEXTILE INDUSTRY

Belgium and Holland. Textile Industries of Belgium and the Netherlands, S. H. Cross and George E. Anderson. Commerce Reports—Supp., Trade Information Bul., no. 105, June 4, 1923, 16 pp. Belgian cotton industry in 1922: ownership and management; manufacturing conditions; manufactured products, export trade and price trend. Dutch cotton and woolen industries in 1922: imports of raw materials; consumptions of stocks and cotton; weaving mills; import and export trade in cotton goods; woolen industry and trade.

TEXTILE MILLS

Electrical Equipment. The Electrical Equipment of a Cotton Mill. Elec. Rev., vol. 92, no. 2376, June 8, 1923, pp. 899–902, 11 figs. Rochdale mills of No. 2 Dunlop Rubber Cotton Mills, Ltd. are entirely electrically driven, and consist of large spinning and weaving establishments equipped with up-to-date machinery for production of cotton cord, fabric, etc. used in manufacture of Dunlop cord tires.

THERMODYNAMICS

Nernst Third Law. Nernst's Heat Theorem (Das Wärmetheorem von Nernst in rechnerischer und zeichnerischer Darstellung), Schmolke. Dinglers polytechnisches Jl., vol. 338, no. 9, May 12, 1923, pp. 91–95, 3 figs. Enunciates a third thermodynamic law, giving numerical and graphic presentations.

THERMOSTATS

Regulation. Research on Thermostats (Recherches sur les thermostats), A. Tian. Journal de Chimie Physique, vol. 20, no. 2, June 1, 1923, pp. 132–166, 2 figs. Disadvantages and defects of present thermostats; thermostats with one, two or more enclosures; regulation of thermostats; results of experiments.

TIRES, RUBBER

Air-Cushion. Shoeing a Car with Low-Pressure Air, J. E. Hale. Soc. Automotive Engrs.—Jl., vol. 13, no. 1, July 1923, pp. 41–50, 41 figs. Describes results of deliberate attempt to make motor vehicles ride on air that is at low pressure, through usage of air-cushion tire having greater carcass flexibility than is usual and by enlarging size of tier section so as to provide greater area of contact between tire and pavement; effect of car operation; durability and tire cost.

Cord. Flat Band Built Cord Tires. India Rubber World, vol. 68, no. 4, July 1, 1923, pp. 625–627, 10 figs. Describes unique method that utilizes maximum strength of cords and affords full control of each stage in balanced tire construction.

Large-Section. Experiments Indicate Possibilities of Large Section Tires, S. P. Thacher. Automotive Industries, vol. 48, no. 26, June 28, 1923, pp. 1375–1378, 7 figs. Advantages of balloon-type pneumatic and reasons for its development.

Patent Specifications. Wheel Tyres, Pneumatic and Other Elastic, and Rims for Use Therewith. Abridgments of Specifications, class 144 (ii), period 1909–15, 1923, 385 pp. Patents for inventions.

TRACTORS

Industrial Plants, Use in. How the Railless Railroad Solves the Unskilled Labor Problem, Matthew W. Potts. Chem. & Met. Eng., vol. 28, no. 24, June 18, 1923, pp. 1061–1064, 4 figs. Tractor and trailer transportation eliminates man-handling around plant; gives advantage of hauling long trains without necessity of following any given path.

TRANSPORTATION

Canadian Routes. Transportation Routes in Canada, Frederick W. Cowie. Eng. Jl., vol. 6, no. 7, July 1923, pp. 313–321, 3 figs. Their relation to enduring production.

Mass. Planning Mass Transportation Facilities, T. Fitzgerald. Engrs.' Soc. West. Pa.—Proc., vol. 39, no. 2, Mar. 1923, pp. 47–68 and (discussion) 69–77. Object and importance of mass transportation; foundations of community development; factors affecting plans; influence of topography; street congestion and rerouting; steam railways; bus; separate grade terminals for surface cars; rapid transit.

TUBES

Seamless Steel. Mill Produces Small Size Tubes, E. F. Ross. Iron Trade Rev., vol. 72, no. 26, June 28, 1923, pp. 1877–1882, 9 figs. New plant of Weldless Tube Co. makes seamless tubing of 3½-in. diam. and smaller; equipment was especially designed to speed up production; forming department provided.

U

UNEMPLOYMENT

Netherlands. Measures to Combat Unemployment in the Netherlands, J. Gerritsz. Int. Labour Rev., vol. 7, no. 6, June 1923, pp. 861–879. Problems following economic crisis of 1920–1921; future problems and their causes.

Payments to Unemployed. Notes on Unemployment Problems. Int. Labour Rev., vol. 7, no. 6, June 1923, pp. 898–932. Bills on unemployment insurance; working of existing systems of insurance; unemployment insurance by industries; unemployment relief for foreign workers; agencies for placement; provision of work. Conditions in France, Germany, Italy, Great Britain, Roumania, Netherlands, and other countries.

V

VARNISHES

Hardness. A Method for the Determination of the Comparative Hardness of Varnish Films, W. H. Wilkinson. Paint Mfrs. Assn. of U. S., Sci. Section, Circular 184, June 1923, pp. 302–304, 3 figs. Comparison of previous methods and description of new one.

VENTILATION

Schoolrooms. The Ventilation of Schoolrooms, George T. Palmer. Am. City, vol. 28, no. 6, June 1923, pp. 571–574, 1 fig. Résumé of results of four years' research conducted by New York State Commission on Ventilation.

VIBRATIONS

String and Spring. On Mechanical Devices for Demonstration of Vibrations of String and Spring, Shuichi Hayashi. Kyoto Imperial Univ., Memoirs of College of Science, vol. 6, no. 3, Mar. 1923, pp. 165–169, 10 figs. Describes instruments devised by author for studying sounds of different pitches.

VISCOSIMETERS

Types. Principles of Viscometry. Indus. Australian & Min. Standard, vol. 69, nos. 1796 and 1797, May 3 and 10, 1923, pp. 712–713 and 734–735. Abstract of lecture before Soc. Chem. Industry of Victoria, containing discussion on: elementary principles of viscometry, by W. Stone; operation of Michell viscometer, by F. E. A. Stone; operation of Macmichael viscometer, by H. L. Longbottom; and construction and merits of various efflux viscometers and operation of Stone's absolute viscometer, by R. Boan.

W

WASTE ELIMINATION

Industrial. Industrial Waste, Oliver Sheldon. Indus. Management (Lond.), vol. 9, no. 12, June 14, 1923, pp. 357–358. Waste is epitomized as anything which prevents most efficient use of personnel, plant, material, power, opportunities and capital, and it is shown how losses in industry arising from these causes may be prevented.

WASTE HEAT

Cement Kilns. Waste Heat from Cement Kilns Operates Entire Mill, H. A. Schaffer. Chem. & Met. Eng., vol. 29, no. 1, July 2, 1923, pp. 18–19. Points out that with efficient prime movers and grinding equipment, entire cement plant may be operated on power from waste-heat boilers.

WATER POWER

India. The Development of Electric Power for Industrial Purposes in India, Khimji B. Thakkur. Stone & Webster Jl., vol. 32, no. 6, June 1923, pp. 616–627, 7 figs. Summarizes water power of chief industrial centers in India, giving present plan capacity and source of energy of public electric supply installations.

Russia. Waterpower Resources of Russia Concentrated in Asia, I. Cutmann. Eng. News-Rec., vol. 91, no. 1, July 5, 1923, p. 9. Vast resources in Asiatic Russia; limited ones in Europe; possible effect on centers of population.

Studies. Water Power Studies, William T. Taylor. Elec. Rev., vol. 92, nos. 2377 and 2378, June 15 and 22, 1923, pp. 924–926 and 991–993, 8 figs. Stream flow.

WATER TREATMENT

Softeners. Steel Mill Installs Modern Softeners, G. S. Reynolds. Blast Furnace & Steel Plant, vol. 11, no. 6, June 1923, pp. 337–339, 4 figs. Investigation shows necessity of improving power and cooling-water conditions, by introduction of latest water softeners.

WELDING. See AUTOGENOUS WELDING; OXY-ACETYLENE WELDING.

WINDING ENGINES

Drum. A Large Winding Drum. Engineer, vol. 135, no. 3521, June 22, 1923, p. 670, 4 figs. partly on p. 662. Describes new winding drum, installed in winding engine of British coal mine, which is 24 ft. in diam. by 12 ft. in width.

Alphabetical List of Advertisers

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(See also page 626 of this issue for supplementary items.)

ABRASIVE WHEELS

Safety Precautions in Use of. Industrial Safety. Int. Labour Rev., vol. 8, no. 1, July 1923, pp. 126–135, 4 figs. Safety precautions in use of manufactured abrasive wheels.

ABRASIVES

Hardness Determination. Determination of Hardness of Abrasive Materials (Härtebestimmung von Schleifmaterialien), Walter Mindt. Werkstattstechnik, vol. 17, no. 11 and 12, June 1 and 15, 1923, pp. 321–326 and 360–367, 34 figs. June 1: Development of methods for determining hardness; mathematical formulas of hardness; empirical determination of constants; relation between grinding efficiency, size of grain and quantity of abrasive; tables and curves. June 15: Experimental results and mathematical formulation of measure of hardness; scope of application of method.

AERONAUTICAL INSTRUMENTS

Control Force Recorder. Notes on the N. A. C. A. Control Force Recorder, H. J. E. Reid. Nat. Advisory Committee for Aeronautics—Technical Notes, No. 150, July 1923, 4 pp., 4 figs. on supp. plates. Emphasizes desirability of using recording instruments in investigation of characteristics of airplanes, with particular reference to Nat. Advisory Committee for Aeronautics control force recorder; description of instrument developed by technical staff of N. A. C. A. to be used as a laboratory instrument for investigations on different types of aircraft.

Diaphragms for. Diaphragms for Aeronautic Instruments, M. D. Hersey. Nat. Advisory Committee for Aeronautics, Report No. 165, 1923, 32 pp., 5 figs. Outline of historical developments and theoretical principles, together with discussion of expedients for making most effective use of existing diaphragms; summary of experimental research problems.

Types. Aeronautic Instruments, Franklin L. Hunt. Technologic Papers of Bur. Standards, no. 237, May 16, 1923, pp. 448–511, 58 figs. Describes various types of altitude, speed, orientation, engine, navigating, and special instruments.

AIR COMPRESSORS

Operation and Upkeep. Air Compressor Operation and Upkeep. Textile World, vol. 63, nos. 15 and 16, Apr. 14 and May 5, 1923, pp. 85, 87 and 90 and 82 and 84, 5 figs. Suggestions for textile installations; storage tank and piping arrangements; lubrication; removing carbon deposits; cost of leaks; cleaning cylinder, valves and receiver; benefits of reducing temperature and having air as dry as possible; etc. Extracts from Massachusetts regulations governing equipment.

Turbo-Compressors. Turbo-Compressors at the Bentinck Colliery. Iron & Coal Trades Rev., vol. 107, no. 2891, July 27, 1923, pp. 115–116, 3 figs. Set is of Rateau type manufactured at Fraser & Chalmers Eng. Works of Gen. Elec. Co., and has normal duty of 10,000 cu. ft. of free air per min. compressed to 80 lb. per sq. in. above atmosphere; details of low-pressure engine.

AIR CONDITIONING

Air Cooling. The Cooling of Air, With a Few Notes on Air Filters, J. Roger Preston. Domestic Eng. (Lond.), vol. 43, no. 7, July 1923, pp. 135–139, 2 figs. How conditions approaching ideal may be obtained in a building when it is hot and humid outside, taking wet bulb of 54 deg. to 58 deg. as a basis.

AIRCRAFT

Control in Warfare. A Proposed International Aircraft Code. Aviation, vol. 15, no. 2, July 9, 1923, pp. 44–47. Commission of jurists drafts rules making aircraft conform to established usage of warfare.

[See also AIRPLANES; AIRSHIPS; BALLOONS.]

AIRPLANE ENGINES

Camshaft Drive Gears, Stresses in. Comparative Mathematical Analysis of the Stresses Occurring in the Cam-Shaft Drive Gears of the Liberty "12" and the Packard "2025" Engines. Air Service Information Circular, vol. 5, no. 423, Apr. 1, 1923, 15 pp., 10 figs. Since it had been found that during endurance tests of Packard "2025" engine that one of the faults of this engine consisted in excessive wear and breakage of teeth of camshaft driving gears, it was decided to investigate stresses existing in these gears mathematically, and to compare these with stresses existing in same gears of Liberty "12" engine.

Differential Coupling. Airplane Engines and Differential Coupling (Le système moteur-avion: L'accouplement différentiel), A. Le Bidolec. Technique Automobile et Aérienne, vol. 14, no. 121, 1923, pp. 45–50, 7 figs. Evolution of airplane engine; decrease in weight, increase in power and safety, multiple shafts; two-, three- and four-engine differential couplings, and their relative efficiency.

Farman. Farman Designs 12-Cylinder Engine for Aviation Service. Automotive Industries, vol. 49, no. 4, July 26, 1923, p. 157, 1 fig. After 50-hr. bench test under control of state engineers, Farman 400-hp. 12-cylinder W-type engine has satisfied all requirements of French Government Aviation Dept. and has been accepted as approved type for planes.

Flexible Mounting. The Flexible Mounting of the Airplane Engine, K. Kutzbach. Nat. Advisory Committee for Aeronautics—Technical Notes, No. 148, July 1923, 5 pp. Deals with suggested installation, of "unbalanced" 8-cylinder V-engine, in that a flexible mounting be used instead of bolting engine rigidly to airplane structure, idea being that flexible mounting would be so adapted that vibrations due to inertia effects would, as it were, "damp themselves out." From Technische Berichte, vol. 3, Pt. 4.

Forces and Stresses, Calculation of. Standard Method of Engine Calculations. Air Service Information Circular, vol. 5, no. 421, Apr. 1, 1923, 36 pp., 27 figs. Outlines and describes methods adopted by Engine Design Branch of Engineering Division, Air Service, for determining forces and analyzing stresses existing in principal parts of an airplane engine.

High-Speed. Influences in the Selection of a Cycle for Small High Speed Engines Running on Solid or Airless Injection with Compression Ignition, Robertson Matthews. U. S. Nat. Advisory Comm. for Aeronautics, Technical Notes, no. 149, July 1923, 14 pp., 4 figs. Limiting conditions in determining form of pressure-volume diagram are indicated mean effective pressure, fuel economy, and permissible maximum pressure. Consideration of these conditions.

AIRPLANES

Accelerations while Maneuvering. The Vertical, Longitudinal, and Lateral Accelerations Experienced by an S. E. 5A Airplane while Maneuvering, F. H. Norton and T. Carroll. U. S. Nat. Advisory Comm. for Aeronautics, Report no. 163, 1923, 3 pp., 7 figs. Investigation carried out at Langley Field Laboratory. Instruments used were N. A. C. A. three-component accelerometer and recording airspeed meter.

Airfoils. Two-Dimensional Aerofoil Theory, Muriel Glauert. Roy. Aeronautical Soc.—Jl., vol. 27, no. 151, July 1923, pp. 348–366, 16 figs. Account of certain methods developed by Joukovsky, Mises and other for calculating forces experienced by body of airfoil shape in stream moving in fixed direction with uniform speed.

British. British Aircraft at Gothenburg, C. G. Grey. Aeroplane (Special Gothenburg Issue), July 1923, 58 pp., 45 figs. Description of British exhibits at Aeronautical Exhibition at Gothenburg, Sweden.

Caspar. Caspar Aircraft at Gothenburg. Aeroplane, vol. 25, no. 5, Aug. 1, 1923, pp. 124 and 126, 6 figs. Describes exhibits of Caspar Werke of Travemünde (Germany) at International Exhibition at Gothenburg.

Cooling-System Flight Test. Cooling System Flight Test of TW-1 Airplane. Air Service Information Circular, vol. 5, no. 410, Apr. 1, 1923, 4 pp., 3 figs. Description of test run Oct. 18, 1921 at Eng. Division, McCook Field, Dayton, Ohio, under direction of cooling-systems branch of power-plant section, to determine effectiveness of cooling system on TW-1 airplane.

Dayton Wright TA-3. Performance Test of Dayton Wright TA-3, Type XIV, Equipped With 80 Le-Rhone, Model "C." Air Service Information Circular, vol. 5, no. 441, May 1, 1923, 5 pp., 6 figs. Summary of results of tests; distribution of weights; pilot's observations; description of airplane and its power plant.

Dornier. The Dornier Commercial Airplane "Komet" (Das Dornier-Verkehrsflugzeug "Komet"). Luftfahrt, vol. 27, no. 6, June 14, 1923, p. 65, 2 figs. All-metal monoplane of steel and duralumin, with accommodation for 6 passengers; length, 10.2 m.; span, 17 m.; weight empty, 1250 kg.; max. load, 750 kg.; max. speed, 170 km. per hr.

Farman. The Farman "Moutsique." Aeroplane, vol. 25, no. 5, Aug. 1, 1923, p. 128, 4 figs. Low-powered wire-braced monoplane of moderate aspect ration.

Flapping-Wing. New Experiments with Machines with Flapping Wings (Ueber neue Versuche mit Schwingenfliegern), Manfred Reiffenstein. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 14, no. 11–12, June 26, 1923, pp. 90–97, 18 figs. Investigations made with models of a Wels flying machine of phenomena occurring with wings in active motion under discharge of energy in the air.

Fokker. The New Fokker Commercial Airplane F V (Das neue Fokker-Verkehrsflugzeug F V). Luftfahrt, vol. 27, no. 6, June 14, 1923, p. 66, 1 fig. Can be used as monoplane or biplane; length, 12 m.; span, 16.2 m.; speed, 162 km. per hr.; weight empty, 1900 kg.; load, 1200 kg.

G. Elias TA-1. Performance Test of G. Elias TA-1, Type XIV Equipped With Lawrence R-9 Engine. Air Service Information Circular, vol. 5, no. 412, Apr. 1, 1923, 6 pp., 6 figs. Summary of results of test; distribution of weights; pilot's observations; description of airplane and its power plant. Radial A. C. type engine of 140 rated hp.

Huff-Daland TA-2. Performance Test of Huff-Daland TA-2 Equipped With Lawrance "R" Engine. Air Service Information Circular, vol. 5, no. 411, Apr. 1, 1923, 5 pp., 6 figs. Summary of results of test; distribution of weights; pilot's observation; description of airplane, and its power plant. Vine-

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 134

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Machy. Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
Midwest Steel & Supply Co. (Inc.)
* Sturtevant, B. F. Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Sturtevant, B. F. Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Elec & Mfg. Co.
Weston Electrical Instrument Co.

Anchorages, Overhead Transmission
Midwest Steel & Supply Co.

Anemometers
Taylor Instrument Cos.
Weber, F. Co. (Inc.)

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
* Combustion Engineering Corp'n
Liptak Fire-Brick Arch Co.
McLeod & Henry Co.

Asbestos Products
* Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Babbit Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* S K F Industries (Inc.)

Barometers
* American Schaeffer & Budenberg Corp'n
Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdy. & Mach. Co.
* Timken Roller Bearing Co.

Bearings, Self-Oiling
Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdy. & Mch. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
Dixon, Joseph Crucible Co.
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
Brown, A. & F. Co.
* Jones, W. A. Foundry & Machine Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Belting, Leatner
American Sole & Belting Leather Tanners (Inc.)

Belting, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Benches, Work
Manufacturing Equipment & Engrg. Co.

Bending & Straightening Machines
Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Machy. Co.

Blocks, Tackle
Clyde Iron Works Sales Co
* Roebling's, J. A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
Clarage Fan Co.
* Green Fuel Economizer Co.
* Sturtevant, B. F. Co.

Blowers, Forge
* Sturtevant, B. F. Co.

Blowers, Pressure
* American Blower Co.
Clarage Fan Co.
Lammert & Mann Co.
* Sturtevant, B. F. Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.
* Sturtevant, B. F. Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n
* Sturtevant, B. F. Co.

Blowers, Steam Jet
* Schutte & Koerting Co.

Blowers, Turbine
* Sturtevant, B. F. Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.
Weber, F. Co. (Inc.)

Boiler Baffles
* King Refractories Co. (Inc.)
McLeod & Henry Co.

Boiler Compounds
Dixon, Joseph Crucible Co.
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
Connelly, D. Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
Webster, Howard J.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
Connelly, D. Boiler Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
* O'Brien, John Boiler Works Co.
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Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

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* Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

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* Scovill Mfg. Co.

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Bridgewalls (Furnace)
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* Brown Hoisting Machinery Co.
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* Gifford-Wood Co.
* Hendrick Mfg Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Furnace & Burner Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Morse Dry Dock & Repair Co. (Fuel Oil Engr'g Dept.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

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* Wood's, T. B. Sons Co.

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Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.
Weber, F. Co. (Inc.)

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

cylinder radial air-cooled engine of 140 rated horsepower.

Lift Distribution. The Distribution of Lift Over Wing Tips and Ailerons, David L. Bacon. Nat. Advisory Committee for Aeronautics—Report, no. 161, 1923, 24 pp., 29 figs. Investigation carried out in 5-ft. wind tunnel of Langley Memorial Aeronautical Laboratory for purpose of obtaining more complete information than was heretofore available on distribution of lift between ends of wing spars, stresses in ailerons, and general subject of air flow near tip of wing.

Military. New British Aircraft at R. A. F. Pageant. Aviation, vol. 15, no. 7, Aug. 13, 1923, 1 fig. Twelve new types of war aircraft for Royal Air Force, including troop-carrying planes, capable of carrying 25 fully equipped soldiers.

N. B. S.-1. Performance Test of N. B. S.-1 (Curtiss) Equipped With Two 400 Liberty "12" Engines. Air Service Information Circular, vol. 5, no. 435, May 1, 1923, 5 pp., 6 figs. Summary of results of test; distribution of weights; pilot's observations; description of airplane and its power plant. Rated hp., 400.

Pressure Distribution. The Pressure Distribution Over the Stabilizer of the Vought VE-7 Airplane. Air Service Information Circular, vol. 5, no. 419, Apr. 1, 1923, 24 pp., 21 figs. Determination of pressure distribution over horizontal surfaces of VE-7 airplane at various altitudes of flight, apparatus and methods.

Research. Exponential Law of Variation of Drift and Lift of Models of Airplanes and Wings at Various Velocities, G. Costanzi, and Mario Bernasconi. Aerial Age, vol. 16, no. 7, July 1923, pp. 325–329, 7 figs. Progress of research work conducted by authors in aerodynamic laboratory of Experimental Aeronautic Inst. of Rome.

Seaplanes. See SEAPLANES.

Speed Measurements. Speed Measurements made by Division "A" of the Airplane Directorate (Flugzeugmeisterei), Subdivision for Flight Experiments, V. Heidelberg and A. Holzel. Nat. Advis. Comm. for Aero., Tech. Notes, no. 147, July 1923, 20 pp., 20 figs. Gives order of magnitude of airplane speeds rather than their accurate values. Reliable speed measurements cannot be carried out above 2000 meters with customary methods. From Technische Berichte, vol. 3, no. 5, pp. 174–179, 1918.

Strutless. The History of the Freely Supported Strutless Airplane (Die Geschichte des freitragenden verspannungslosen Flugzeuges), E. Meyer. Motorwagen, vol. 26, nos. 16, 17, 18 and 19, June 10, 20, 30 and July 10, 1923, pp. 247–250, 266–270, 279–284 and 297–303, 64 figs. History of development of airplanes with strutless freely supported wings, first patented by Dr. Hugo Junkers in 1910; review of numerous European and American designs since developed. Bibliography.

Struts. Tests on Built-Up Airplane Struts Having Initial Tension in Outside Fibers, T. A. Schwamb and C. S. Smith. Nat. Advisory Committee for Aeronautics—Technical Notes, no. 151, Aug. 1923, 6 pp., 14 figs. on supp. pages. Abstract of a thesis performed by authors in June 1922, as required for degree of Bachelor of Science at Mass. Inst. of Technology.

Wing Pressures. Airplane Research Work through Flight Tests. Aviation, vol. 15, no. 6, Aug. 6, 1923, pp. 154–155, 3 figs. Wing pressures on Thomas-Morse pursuit plane measured in flight by multiple manometer.

Wing Profiles. A Comparison of Some Modern Wing Profiles, Matthew B. Sellers. Aviation, vol. 15, no. 7, Aug. 13, 1923, pp. 182–184, 1 fig. Eleven optimum profiles selected from N. A. C. A. reports satisfy requirements of most airplanes.

Wing Ribs. The Strength of Wing Ribs. Air Service Information Circular, vol. 5, no. 443, May 1, 1923, 18 pp., 18 figs. Summarizes results of a study of all available American data on strength of wing ribs in order to develop a standard of comparison for new designs; develops for this purpose curves based on strength-weight ratio.

Wing Spars. The Effect of Eccentricities on Stresses in Airplane Spars. Air Service Information Circular, vol. 5, no. 438, May 1, 1923, 10 pp., 10 figs. Illustrates and compares methods of analyzing and computing effect of eccentricities in wing fittings on moments, shears, and stresses in wing spars.

AIRSHIPS

Helium in. The Employment of Helium in Airships, A. Crocco. Aviation, vol. 15, no. 4, July 23, 1923, pp. 97 and 100. Consumption during navigation; osmotic diffusion; replacement on account of washings.

Slide Rule for. An Airship Slide Rule, E. R. Weaver and S. F. Pickering. Nat. Advisory Committee for Aeronautics, Report No. 160, 1923, 12 pp., 3 figs. Describes rule which is intended primarily to give rapid solutions of a few problems of frequent occurrence in airship navigation, but can be used to advantage in solving a great variety of problems, involving volumes, lifting powers, temperatures, pressures, altitudes, and purity of balloon gas.

ALIGNMENT CHARTS

Construction Method. Practical Construction of Alignment Charts, R. T. Livingston. Power Plant Eng., vol. 27, no. 16, Aug. 15, 1923, pp. 824–826, 4 figs. Their purpose, methods of use, and outline of method of construction.

ALLOYS

Aluminum. See ALUMINUM ALLOYS.

Light and Extra-Light. Light and Extra-Light Alloys. Engineering, vol. 116, no. 3006, Aug. 10, 1923, p. 172. Discusses relative methods of both, and points out advantages of extra light alloys.

Rust-Resisting. Rust-resisting Alloys, W. R. Douglas Shaw. Mech. World, vol. 74, no. 1906, July 13, 1923, p. 25. Survey of number of alloys in light of existing knowledge.

ALUMINUM

Corrosion of. Aluminium from a Corrosion Point of View, W. R. Douglas Shaw. Beama, vol. 13, no. 64, Aug. 1923, pp. 100–103. Aluminum alloys and their non-corrodible properties; aluminum foil; solder and corrosion; aluminum applied in form of oxide coating to protect other metals from certain acids.

Sheet, Properties of. The Mechanical Properties of Sheet Aluminum, A. G. C. Gwyer. Birmingham Met. Soc.—Jl., vol. 8, no. 2, 1923, pp. 33–49 and (discussion) 49–52, 13 figs. Describes experiments which were carried out with object of determining certain mechanical properties of sheet aluminum, but which are also of interest in connection with sheet metal generally; methods and machines for hardness testing.

ALUMINUM ALLOYS

Aluminum-Titanium. Aluminum-Titanium Alloys and the Influence of Titanium on Aluminum (Aluminium-Titan-Legierungen und der Einfluss des Titans auf Aluminium), Eugen van Erckelens. Metall u. Erz, vol. 20, no. 11, June 8, 1923, pp. 206–210, 1 fig. Investigation of diagram of state; favorable influence of titanium on aluminum seems to be due to dispersion of nitrogen and oxygen present in aluminum.

Aluminum-Zinc-Tin. The Ternary System Aluminum-Zinc-Tin (Il sistema ternario alluminio-zinco-stagno), E. Crepaz. Giornale di Chimica Industriale ed Applicata, vol. 5, no. 3, Mar. 1923, pp. 115–122, 5 figs. Discusses tin-zinc and aluminum-tin alloys, and their manufacture, electrical properties, etc.; results of experiments.

Analysis. The Analysis of Light Aluminium Alloys. Metal Industry (Loud.), vol. 23, no. 3, July 20, 1923, pp. 45–47. Sampling; estimation of copper, lead, magnesium, manganese, silicon, iron, zinc, and aluminum. Translated and slightly abridged from Chaleur et Industrie.

APPRENTICES, TRAINING OF

LeBlond System. LeBlond Vocational Training Course, W. H. Myers. Am. Mach., vol. 59, no. 7, Aug. 16, 1923, p. 263. Apprenticeship system of R. K. LeBlond Machine Tool Co.

ASH HANDLING

Methods. Mechanical Ash Conveying, David Brownlie. Beama, vol. 13, no. 64, Aug. 1923, pp. 113–120, 8 figs. Review of modern methods.

AUTOMOBILE ENGINES

Carburetors. See CARBURETORS.

Eight-in-Line. Interest in Eight-in-Line Engines Centers in Crankshaft Layout. Automotive Industries, vol. 49, no. 4, July 26, 1923, pp. 166–169, 8 figs. Vibration caused by elastic deformation reduced in new Packard by use of nine main bearings; analysis shows that theoretical unbalanced conditions is less than that which might be created by slight, permissible inaccuracies in manufacturing operations.

AUTOMOBILE FUELS

Alcohol. Alcohol as a Motor Fuel (L'emploi de l'alcool comme carburant), Eugene Grandmougin. Génie Civil, vol. 83, no. 1, July 7, 1923, pp. 5–8. Discusses question of production on a large scale and low price; processes for production, including chemical; improvements necessary in fermentation process; use of beet sugar.

Paris Buses Test Efficiency of Alcohol as Engine Fuel. Automotive Industries, vol. 49, no. 6, Aug. 9, 1923, p. 257. Experiments show 50–50 mixture with benzol best from dual standpoint of stability and economy; product should be of highest purity to reduce oxidation and carbonaceous deposits.

Dewpoint Determination. Direct Determination of Dew Points of Gasoline-Air Mixtures, W. A. Gruse. Indus. & Eng. Chem., vol. 15, no. 8, Aug. 1923, pp. 796–799, 5 figs. Method for direct determination of dewpoints in proportions required for internal-combustion engines; suggested as suitable for comparison and evaluation of motor fuels.

Gasoline. See GASOLINE.

Specifications. Motor and Aviation Spirit. British Eng. Standards Assn., no. 121, Apr. 1923, 7 pp. Specifications covering distillation and acidity of motor spirit, and appearance, specific gravity, distillation, residue on evaporation, aromatic hydrocarbons, toluene equivalent of aromatics, acidity, and sulphur content, of aviation spirit.

AUTOMOBILE MANUFACTURING PLANTS

A. C. Light Cars. A Thames-side Motor Car Works. Engineer, vol. 136, no. 3525, July 20, 1923, pp. 77–78, 3 figs. Methods and equipment employed in manufacture of A. C. light cars.

Ford River Rouge Plant. Ford Principles and Practice at River Rouge, John H. Van Deventer. Indus. Management (N. Y.), vol. 66, no. 2, Aug. 1923, pp. 85–95, 33 figs. Manufacture of Ford-car bodies.

Franklin Co. Production Methods. Seeking Simple Production Methods Saves Time and Money, W. L. Carver. Automotive Industries, vol. 49, no. 6, Aug. 9, 1923, pp. 276–280, 11 figs. Special department at Franklin constantly studies manufacturing system; has simplified many operations and reduced cost materially without installation of expensive equipment; portable electric and pneumatic tools help to effect economy.

Rolls-Royce, Springfield, Mass. Rolls-Royce of America Inc. Eng. Production, vol. no. 6, no. 130, July 1923, pp. 327–332, 19 figs. Plant modeled after one at Derby, England, but not running at maximum production as yet. Description of plant and equipment.

AUTOMOBILES

Alvis. The 12-40 Hp. Alvis Chassis. Automobile Engr., vol. 13, no. 178, July 1923, pp. 194–202, 16 figs. Medium size and good power-weight ratio features of design.

Armstrong Siddeley. A New Armstrong Siddeley. Autocar, vol. 51, no. 1446, July 6, 1923, pp. 11–13, 6 figs. Four-cylinder 14-hp. engine; details of design.

Bodies. Application of Aluminum to Construction of Motor Car Bodies. Automotive Mfr., vol. 65, no. 3, June 1923, pp. 11–13. Superiority for panels; other uses, including bonnets, radiator shells, dashboards, wheel parts, etc.

Exceptional Durability is Claimed for New Body Finish, Herbert Chase. Automotive Industries, vol. 49, no. 4, July 26, 1923, pp. 158–159. Product called Duco, made from cellulose, is developed by Du Pont Co. for use in place of color varnish; rapid drying without baking and ease of application among advantages; no rubbing between coats required.

The Kali All-Weather Bodies (Kali Jedwetterkarosserie). Allgemeine Automobil-Zeitung, vol. 24, no. 22, June 6, 1923, pp. 32–33, 13 figs. German patented automobile body which is provided with a collapsible top in leather, feather cloth, rubber, or other material, and with collapsible window plates enclosed when not in use in sides of body.

Brakes. Four-Wheel Brakes. Autocar, vol. 51, no. 1449, July 27, 1923, pp. 153–157, 11 figs. Practical experiences with cars having brakes on all four wheels; likelihood of many standardized types of cars having four-wheel brakes in 1924.

Flint. Tubular Backbone Frame Reinforcement Used on New Flint. Automotive Industries, vol. 49, no. 3, July 19, 1923, pp. 122–127, 9 figs. This construction and seven-bearing crankshaft are outstanding features; units designed to secure maximum characteristic Durant practice shown in four-point suspension of engine, open flywheel and location of gear set amidships.

Front Axles. Manufacture of Automobile Front Axles, Edward K. Hammond. Machy. (N. Y.), vol. 29, no. 12, Aug. 1923, pp. 939–942, 12 figs. Machining operations on axle forgings, steering knuckles, and steering arms.

Gearshifts. New Mechanical Gearshift Eliminates Levers in Front Compartment. Automotive Industries, vol. 49, no. 3, July 19, 1923, pp. 108–109, 7 figs. Description of mechanical gearshift operating in conjunction with clutch pedal, put on market by Sector Gear Shift & Mfg. Co. of Detroit; designed to be applicable to any make of car, and operates with a pre-selective device controlled by hand lever on a sector mounted on steering column.

Grand Prix Race. Technical Aspects of Grand Prix Cars. Autocar, vol. 51, no. 1447, July 13, 1923, pp. 61–63, 8 figs. Review of new Fiat supercharger; weights and details of competing cars.

Manufacture. German Automobile Manufacture in 1923 (Deutscher Kraftfahrzeugbau im Jahre 1923), R. Dietfeld. Wirtschaftsmotor, vol. 5, nos. 2, 3, 4, 5 and 6, Feb., Mar., Apr., May and June, 1923, pp. 3–6, 3–5, 4–6, 4–6 and 4–6, 51 figs. Compilation of data based on direct inquiries from manufacturers, covering 1922 and 1923.

Small Car Production. Automobile Engr., vol. 13, no. 178, July 1923, pp. 208–212, 15 figs. Production methods of Belsize Motors, Ltd., Clayton, England.

Palladium. A British 1½-Litre 4-Wheel Brake Car. Autocar, vol. 51, no. 1448, July 20, 1923, pp. 115–116, 4 figs. Describes new Palladium light four-seater; 12 hp.; fuel consumption 30 m. p. g.

Sizaire-Berwick. The 13-26 Hp. Sizaire-Berwick. Auto-Motor Jl., vol. 28, no. 27, July 5, 1923, pp. 555–558, 11 figs. Essentially British car both in design and manufacture; engine, clutch and gear built as one unit; 4-cylinder engine with valves all one side and driven by silent chain; cylinders en bloc.

Steyr. The New "Type Five" Six-Cylinder Steyr. Auto-Motor Jl., vol. 28, no. 29, July 19, 1923, pp. 599–602, 11 figs. 23.8-hp. monobloc engine with 80 mm. bore and 110 mm. stroke; streamline body and pointed radiator features of design.

Talbot. The 10-23 Hp. Talbot Car. Auto-Motor Jl., vol. 28, no. 28, July 12, 1923, pp. 577–580, 11 figs. Four-cylinder engine, clutch and gear in one unit, with monobloc cylinder and crankcase construction; details of design.

Trojan. The Trojan Utility Car. Auto-Motor Jl., vol. 28, no. 30, July 26, 1923, pp. 619–622, 12 figs. Economical car with simple power and transmission mechanism; solid tires and efficient springing essential features; 4-cylinder horizontal engine with pairs of cylinders operating together on two-stroke principle.

AVIATION

Airship Line, Spain and S. America. The Proposed Airship Line Between Spain and South America. Flight, vol. 15, no. 21, May 24, 1923, pp. 276–278. Abstract of report on plans drawn up by Commandante Emilio Herrera and Hugo Eckener of Zeppelin Co.

Airways. Organizing the National Airway System. Aviation, vol. 15, no. 2, July 9, 1923, pp. 41–43, 2 figs. What Airway Section of Army Air Service is doing to facilitate flying across country.

Civil. Progress of British Civil Aviation, 1922–23. Aviation, vol. 15, no. 7, Aug. 13, 1923, pp. 184–186. Summary of annual report of Civil Air Department records satisfactory growth of civil flying.

Manufactured by Advertisers

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Alphabetical List on page 134

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B

BALANCING

Theory and Tests. Theory and Experimental Testing of Balancing (Zur Theorie und experimentellen Prufung des Auswuchtens), Eberhard v. Brauchitsch. Zeit fur angewandte Mathematik u. Mechanik, vol. 3, no. 2, Apr. 1923, pp. 81–92, 17 figs. Investigation of applicability of Lawaczek-Heymann balancing machine and method of balancing.

BALLOONS

Flying-Over-Water Hazards. Free Balloon Hazards in Flying over Water. Aviation, vol. 15, no. 4, July 23, 1923, pp. 93–95, 1 fig. Safety measures recommended for lessening risk.

BEARINGS, BALL

Endurance. The Endurance of Ball Bearings, with Particular Reference to Automobile Practice, A. W. Macaulay. Automobile Engr., vol. 13, no. 178, July 1923, pp. 213–223, 20 figs. Discusses ball-bearing capacity, fatigue, combined radial and thrust loads, different types of bearings, commercial tests, and other points in connection with designing for endurance.

Finish Grinding. Abrasives Finish Steel Balls, K. H. Lansing. Abrasive Ind., vol. 4, no. 7, July 1923, pp. 207–210, 10 figs. Ball bearings rough-ground before hardening and finish-ground and polished after heat treating; inspection.

Manufacture. How Ball Bearings Are Produced, Herbert R. Simonds. Abrasive Industry, vol. 4, no. 8, Aug. 1923, pp. 238–243, 14 figs. Extreme accuracy made possible by grinding machines equipped with direct-reading gages; assembly is an important operation.

BELTING

Leather. Leather Belt Formulae Combining Theory with Practice, Claude O. Streeter. Belting, vol. 23, no. 1, July 1923, pp. 44, 46 and 48, 1 fig. Rules for belt speed, arc of contact, effective tension, horsepower and belt width.

BLAST FURNACES

Linings, Monolithic. Using Monolithic Linings for Hot Blast Stoves. Iron Trade Rev., vol. 73, no. 7, Aug. 16, 1923, p. 462, 2 figs. Applied in relining two-pass, side-combustion hot-blast stove at plant of Steel Co. of Can., Hamilton, Ont.; believed to be one of the largest one-piece linings ever installed. See also Iron & Steel of Can., vol. 6, no. 8, Aug. 1923, pp. 166–167, 3 figs.

Modern Theories. The Practical Success of Newer Theories of the Blast Furnace (Ueber die praktischen Erfolge neuer Theorien des Hochofens), W. Mathesius. Stahl u. Eisen, vol. 43, nos. 27 and 28, July 5 and 12, 1923, pp. 873–879 and 907–910 (and discussion, 910–912), 12 figs. on supp. plate. Mathematical derivation of formula for practical results from fundamental working processes in blast furnace; application to practical cases and development of charts of blast-furnace practice for gray and white pig iron; possible savings of coke; combustibility of coke.

BLOWERS

Centrifugal. Centrifugal Blast-Furnace Blower. Engineering, vol. 116, no. 3006, Aug. 10, 1923, pp. 170–171, 6 figs. Cable of compressing 40,000 cu. ft. of free air per min. to 25 or 30 lb. per sq. in. gage pressure.

Gas, Mechanical Efficiency of. The Mechanical Efficiency of Gas Blowers (Die mechanische Wirkungsgrad der Gasgeblasemaschinen), Fr. Kretzschmer. Archiv fur Warmewirtschafte, vol. 4, no. 7, July 1923, pp. 121–124, 6 figs. Theoretical testing of experimentally found curves; results of insufficient loading of blower; thermal utilization of blast-furnace gas in blower.

BOILER FIRING

Coke Breeze. Coke Breeze as Fuel for Steam Boilers in Great Britain, C. H. S. Tupholme. Gas Age-Rec., vol. 52, no. 1, July 7, 1923, pp. 3–6. Definition of coke breeze; types of boilers adaptable to its use; flues and draft, grafts and clinkering; dust from coke firing, etc.

BOILER FURNACES

Low-Grade Fuels. Adler & Hentzen Furnaces for Power Plants (Adler & Hentzen-Feuerungen fur den Kraftbetrieb), H. Pradel. Chemiker-Zeitung, vol. 47, no. 83, July 12, 1923, pp. 593–597, 8 figs. Describes improvements in furnace design permitting use of low-grade fuel, such as lignite, briquets, peat and different waste fuels.

Oil-Burning. Oil Burning Furnaces, James A. Tyrrell. Nat. Engr., vol. 27, no. 8, Aug. 1923, pp. 359–360. Advantages and objections to use of preheated air in oil-burning furnaces.

BOILER PLANTS

Heat-Storage Installations. Critical Discussions of Plants with Heat Storage (Kritische Betrachtungen uber Anlagen mit Warmespeichern), Wilh. Pape. Warme, vol. 46, no. 25, June 22, 1923, pp. 269–271, 3 figs. Advantages and disadvantages of the different storage systems with regard to fluctuations of steam for power and superheated steam; suggestions for improvements.

Instruments. Boiler and Turbine Room Instruments, W. A. Shondy. Combustion, vol. 9, no. 2, Aug. 1923, pp. 157–159, 5 figs. Instruments for station operators; indicating instruments; steam flowmeters; variation of CO_2 and temperature in furnaces and flues. Report relative to combustion accessories from N. E. L. A. Prime Movers Committee report.

Scientific Instruments in the Boiler House, John B. C. Kershaw. Power Engr., vol. 18, nos. 207 and 208, June and July 1923, pp. 217–224 and 257–262, 24 figs. Describes instruments and apparatus which can be installed at moderate cost and operated without additions to boiler-house staff, as well as more elaborate types, including gas-sampling and testing apparatus, CO and CO_2 recorders, thermometers, draft gages, combined instruments, etc.

BOILER ROOMS

Features. Boiler-Room Features of Northeast Station (Kansas City). Power, vol. 58, no. 7, Aug. 14, 1923, pp. 249–251, 4 figs. Special high-pressure piping; hydraulic operation of long valves; combination valve bypass and drain; station heat balance.

BOILERS

Electrically Heated. New Uses of Electric Steam Boilers, P. H. Falter. Indus. Engr., vol. 81, no. 8, Aug. 1923, pp. 403–405 and 422, 3 figs. Conditions under which electric steam boilers can be used economically; data regarding electric boiler installations, and results obtained in several plants.

The Generation of Steam by Electricity, Philip H. Falter. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 7, July 1923, pp. 211–238 and (discussion) 239–251. Review of development of electric steam boiler or generator; electrode or water-resistance method of heating electrically; designs of electric boilers or water heaters.

High-Efficiency. High-Power Boilers (Hochleistungs-Dampfkessel), F. Wilcke. Der praktische Maschinen-Konstrukteur, vol. 56, no. 13, Apr. 13, 1923, pp. 115–124, 37 figs. partly on supp. plate. Notes on boilers for 60 atmos. pressure; inclined-tube boilers; locomobile and locomotive boilers; superheaters; flue-gas heaters and steam storage.

N. E. L. A. Committee Report. Boilers, Superheaters and Economizers, J. T. Barron. Combustion, vol. 9, no. 2, Aug. 1923, pp. 126–147 and 185, 25 figs. Notes on boiler baffles; circulation in wide boilers; feedwater regulators; soot blowers; superheaters; economizers. Manufacturers' statements. Report relative to combustion accessories from N. E. L. A. Prime Movers Committee report.

Repairing. Boiler Repair Practice in M. C. Shops at Jackson. Boiler Maker, vol. 23, no. 7, July 1923, pp. 187–191, 9 figs. Methods employed in boiler shop of Michigan Central Railway at Jackson, Mich., including record of oxy-acetylene cutting work.

Waste-Heat. Waste-Heat Boilers (Abhitzekessel), H. Frey. Archiv fur Warmewirtschaft, vol. 4, no. 4, Apr. 1923, pp. 67–69, 12 figs. Description of various German types.

BOILERS, WATER TUBE

American. Critical Discussion of American Water-Tube Boilers (Kritische Betrachtungen amerikanischer Wasserrohrkessel), B. Marker. Warme, vol. 46, no. 28, July 13, 1923, pp. 308–309, 5 figs. Thermotechnical calculation of American boilers; examination of American boiler designs on basis of German experiences, and conclusions therefrom.

BRAKES

Air. Test of the Automatic Straight Air Brake on the Norfolk & Western Railway. Ry. & Locomotive Eng., vol. 36, no. 7, July 1923, pp. 232–234. Outline of proposed tests to demonstrate different points in connection with use of automatic straight air brake.

BUSES

Trolley. Trackless Trolley 'Buses. Motor Transport (Lond.), vol. 37, no. 957, July 2, 1923, pp. 40–41, 5 figs. Advantages and limitations of trackless trolley buses and particulars of leading types in service.

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CABLES, HOISTING

Steel, Testing of. Non-destructive Testing of Steel Hoisting Rope, Raymond L. Sanford. Min. & Met., vol. 4, no. 199, July 1923, pp. 333–336, 6 figs. Criteria for a satisfactory test; possible methods; magnetic analysis. Published with approval of Director of Bur. Mines.

CABLEWAYS

Coal Mines. Taking Coal by the Air Route to Coal Station, Charles K. Traber and Walter C. Richards. Coal Age, vol. 24, no. 5, Aug. 2, 1923, pp. 175–177, 6 figs. Aerial tramway at Williamson, W. Va., eliminates two bridges, much track and trestling, yet cuts hauling costs; lifting coal 85 ft., it easily handles 1000 tons in 8 hours.

CAMS

Design. Design of Harmonic Cams, G. O. Rhys. Machy. (N. Y.), vol. 29, no. 12, Aug. 1923, pp. 934–935, 2 figs. Table of formulas to facilitate work of laying out cams.

CAR WHEELS

Heating on Grades. Heating of Car Wheels on Grades, Geo. L. Fowler, Ry. & Locomotive Eng., vol. 36, no. 8, Aug. 1923, pp. 245–246. Study by which tests of Bur. of Standards and University of Ill. are compared to corresponding work in service.

Manufacture. The Manufacture of Railway Wheels and Axles. Machy. (Lond.), vol. 22, no. 564, July 19, 1923, pp. 394–497, 10 figs. Methods employed in forge and machine shops of Wm. Beardmore & Co., Ltd., Parkhead, Glasgow, Eng.

The Manufacture of Railway Wheels and Tyres. Machy. (Lond.), vol. 22, no. 563, July 12, 1923, pp. 461–467, 10 figs. Methods employed in forge and machine shops of Wm. Beardmore & Co., Ltd., Parkhead, Glasgow, England.

CARBURETORS

Graetzin. Heavy Oils for Automobile Engines, H. Frymark. Automobil-Rundschau, vol. 22, no. 5, May 1923, pp. 44–46, 4 figs. The Graetzin-heavy-oil carburetor.

Kerosene. The Commer Paraffin Carburetor. Engineering, vol. 116, no. 3006, Aug. 10, 1923, pp. 185–186, 4 figs. Works on principle of vaporizing kerosene by direct contact with very hot gas or air instead of transmitting heat through metal walls or tubes in accordance with usual practice.

CARS

Origin and Development. Railroad Cars Their Origin and Development, E. F. Carry. Ry. Mech. Engr., vol. 97, no. 7, July 1923, pp. 445–450, 5 figs. What growth in capacity has meant to civilization and factors making it possible; freight and passenger car development, and development of car equipment in relation to traffic.

CARS, COAL

Hoppers. The Rejuvenation of the McAdoo Hoppers. Ry. Rev., vol. 73, no. 3, July 21, 1923, pp. 89–91, 6 figs. Norfolk & West. Ry. rebuilds wooden-body hopper cars constructed during war with all-steel structures.

CARS, FREIGHT

Box. New Box Cars of the Southern Pacific, W. E. Symons. Ry. & Locomotive Eng., vol. 36, no. 8, Aug. 1923, pp. 239–242, 6 figs. Important feature of new cars is cast-steel underframe or center section all in one piece.

New Designs of Box Cars for the Santa Fe. Ry. Mech. Engr., vol. 97, no. 8, Aug. 1923, pp. 573–577, 8 figs. Construction embodies new arrangement of side posts, underframe bracing, and door opener and closer.

Combination Stock and Coal. Design of Combination 40-Ton Stock and Coal Car. Ry. Rev., vol. 73, no. 5, Aug. 4, 1923, pp. 159–169, 10 figs. Details of combination stock and coal car, designed for C. M. & St. P. Ry. to reduce empty-car mileage and increase average tons per loaded car.

Reinforced-Concrete. Reinforced-Concrete Railway Cars (Eisenbahnfahrzeuge aus Eisenbeton), A. Kleinlogel. Glasers Annalen, vol. 93, no. 3, Aug. 1, 1923, pp. 41–45, 8 figs. Types in use for transportation of coal, cement, ore, and wine.

Repairing. Unit System of Repairing Freight Cars. Ry. Age, vol. 75, no. 2, July 14, 1923, pp. 70–74, 8 figs. Practice at Readville shops of New York, New Haven & Hartford.

Steel. Reducing the Corrosion in Steel Cars, J. J. Tatum. Ry. Mech. Engr., vol. 97, no. 7, July 1923, pp. 413–416, 7 figs. Analysis for low-carbon steel generally used in freight-car work; steel containing small percentage of copper adopted to prevent rapid deterioration; specifications for copper-bearing miscellaneous sheets and structural steel.

CARS, PASSENGER

Great Western Ry. New Main Line Express Trains, Great Western Railway. Ry. Gaz., vol. 39, no. 2, July 13, 1923, pp. 49–52, 11 figs. partly on pp. 53–58. Details of new cars now running between London and South Wales, Birmingham and Birkenhead.

CARS, TANK

Milk Transportation. A 6000 Gallon Refrigerator-Tank Car for Milk. Ry. Rev., vol. 73, no. 2, July 14, 1923, pp. 61–65, 4 figs. Glass-lined tanks provide economical and sanitary transportation for milk. Cars used in Chicago district.

CASE-HARDENING

Properties and Treatment of Articles. Some Considerations About Case Hardening, Leslie Aitchison. Birmingham Met. Soc.—Jl., vol. 8, no. 5, 1923, pp. 183–190. Constituents of a case-hardened article; properties of case and core; heat treatment of case-hardened articles; mechanical treatment of case-hardened article.

CAST IRON

Refining. The Refining of Cast Iron through Nickel Addition (Ueber die Veredelung des Gusseisens durch Nickelzusatz), E. Piwowarsky and K. Ebbefeld. Stahl u. Eisen, vol. 43, no. 30, July 26, 1923, pp. 967–968, 1 fig. New tests confirm observation on refining influence of nickel addition.

Vanadizing. Vanadium in Iron Foundry, J. Kent Smith. Foundry Trade Jl., vol. 28, no. 361, July 19, 1923, pp. 52–53. Vanadizing of cast iron; effect as shown by tensile testings; transverse results; compression tests; application to cupola metal; air-furnace procedure; vanadium and chilled rolls.

CASTING

Brass and Bronze. Casting Brass and Bronze, Charles Vickers. Foundry, vol. 51, no. 14, July 15, 1923, pp. 578–581. Copper oxidized in metal treated with deoxidizers which reduce copper, forming other oxides; carbon monoxide gas protects metal from oxidation; zinc an active deoxidizer.

Pressure System. Feeding Heads Not Necessary, Roy E. Paine. Foundry, vol. 51, no. 14, July 15, 1923, pp. 559–561 and 597, 9 figs. Practical application of pressure system of pouring in a non-ferrous foundry would seem to indicate that method is preferable to use of feeding heads.

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Alphabetical List on page 134

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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

CASTINGS

Automobile. Laboratory Control in Automobile Castings. Henry M. Lane. Iron Age, vol. 112, no. 4, July 26, 1923, pp. 212–214, 8 figs. Sand and iron subjected to searching analyses; moisture and porosity tests; use of diagrams for presenting data.

"Burning-on" Treatment. Salvaging Castings by "Burning on." F. C. Edwards. Metal Industry (Lond.), vol. 23, no. 1, July 6, 1923, pp. 11–12, 5 figs. Process of heat treatment exerting an annealing influence, leaving castings stronger than they were originally.

Cleaning. New Regulations Proposed for the Cleaning of Castings. Foundry Trade Jl., vol. 28, no. 359, July 5, 1923, pp. 3–6, 1 fig. Abstract of report on Grinding of Metals and Cleaning of Castings issued by Home Office, England. Cleaning of castings; sand blasting; regulations for grinding and glazing of metals and cleaning of castings.

Faults. Causes of Faulty Castings. R. W. Muller. Metal Ind. (Lond.), vol. 23, no. 1, July 6, 1923, pp. 3–5. General causes of faulty castings which may be prevented. Warped patterns; unsuitable molding sand; defects in molds; etc. Translation from Die Giesserei.

Machine-Shop. Castings from a Machine-Shop Point of View. C. R. Ormerod. Foundry Trade Jl., vol. 28, no. 362, July 26, 1923, pp. 80–81 and discussion, 81–84. Faulty designing; cylinder castings in machine shops; valve-box castings; streaky castings; sticking jigs and frames; poor-quality malleable; rejected castings; etc.

CENTRAL STATIONS

Generator Ratings, U. S. Central Station Generator Ratings. Total 17,715,484 Kva. Elec. World, vol. 82, no. 6, Aug. 11, 1923, p. 283, 1 fig. On Oct. 1, 1922, there were 5974 generating and transmission systems in United States, of which 66.3 per cent were privately operated.

CHIMNEYS

Draft Calculation. Influences of Sea Level and Atmospheric Conditions on Draft of a Chimney (Einfluss der Meereshöhe und der Witterung auf die Zugstärke eines Kamins). E. Höhn. Schweizerische Bauzeitung, vol. 81, no. 25, June 23, 1923, pp. 308–311. Formulas for calculation of draft.

COAL

Measurement, Volumetric. Volumetric Measurement of Coal. James E. Lea. Nat. Engr., vol. 27, no. 8, Aug. 1923, pp. 353–354. Principles of coal measurement on a volumetric basis; equal volumes of same kind of coal weigh the same, irrespective of size. Paper read at N. A. E. S. Convention.

Specifications. Fuel Specifications. Combustion, vol. 9, no. 2, Aug. 1923, pp. 162–165. Specifications for coal applicable to conditions in various parts of United States. Report presented by N. E. L. A. Prime Movers Committee.

COAL HANDLING

Boiler Plants. Modern Coal and Ash Handling in Boiler Plants (Neuzeitige Kesselbekohlung und -entaschung). Richard Hanchen. Archiv fur Warmewirtschaft, vol. 4, nos. 5 and 6, May and June, 1923, pp. 81–86 and 106–111, 38 figs. Unloading, storage, conveying to boiler house, and stoking of coal and other fuels; drawing ash under boilers, loading ashes and clinker, etc.; apparatus used.

Economical. Power Problems of Vital Interest to Executives. James T. Beard, 2nd. Indus. Management (N. Y.), vol. 66, no. 2, Aug. 1923, pp. 109–114, 8 figs. Economical storage and handling of coal.

Conveyors. Coal Conveyors for Small and Medium Sized Boiler Plants. Southern Engr., vol. 39, no. 6, Aug. 1923, pp. 35–42, 19 figs. Some of the conveying systems that may be used to advantage, with operating data.

Steam Power Plant Management. Robert June. Gas Age Rec., vol. 51, no. 23, and vol. 52, nos. 2, 3 and 4, June 9, July 7, 21 and 28, 1923, pp. 737–740, 9–11, 63–65 and 103–105, 20 figs. Principal factors which influence choice of ash- and coal-handling systems; description of the various systems, including hand shoveling, conveyors, hoists, cranes, vacuum system, and combinations of above (so-called "silo" system; etc.)

COAL STORAGE

Cable Drag Scraper. Coal Storage at the Robert Gair Company Plant, J. A. Beck. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 200–202, 5 figs. Installation of cable drag scraper for storing and reclaiming coal; consists of steel scraper attached to endless steel cable, which is operated by double-drum winding machine and runs out across yard to steel posts planted around storage area.

COKE

Recovery from Ashes. Experiences of Coke Recovery by the "Columbus" Process. Gas Jl., vol. 163, no. 3140, July 18, 1923, p. 310, 1 fig. Experience gained at some of the gas works where coke recovery is carried out by this method.

COMBUSTION

Surface, Incandescent. Surface Combustion with Special Reference to Recent Developments in Radiophragm Heating. William A. Bone. Roy. Soc. Arts—Jl., vol. 71, no. 3686, July 13, 1923, pp. 596–608 and (discussion) 608–610, 6 figs. Principle of incandescent surface combustion; recent developments in manufacture of radiophragm appliances.

COMPRESSED AIR

Applications. Compressed Air. Eng. Production, vol. 6, nos. 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129 and 130, Jan. 4, 11, 18, 25, Feb. 1, 8, 15, 22, Mar., Apr., May, June and July, 1923, pp. 13–20, 37–44, 51–55, 83–87, 113–116, 129–132, 152–155, 208–212, 186–212, 231–233, 276–278, 292–296 and 334–337, 176 figs. Application to modern engineering manufacture. Describes various types of compressors and their constructional features, pneumatic hammers, riveting machines, drills, scrapers, chucks, mandrels, fixtures for cash-register parts and surface grinding machines, machine-tool units, etc.

Pneumatic Mail Tubes. The Technology of the Munich Municipal Pneumatic-Mail-Tube Apparatus (Die Technik der Munchener Stadt-Rohrpostapparate). Hans Schwaighofer. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 27, July 7, 1923, pp. 653–657, 11 figs. Technical details of hand-operated Universal apparatus of Munich pneumatic mail tube, and experimental semi-automatic apparatus; high-pressure pneumatic receiving and transmitting apparatus for automatic operation.

CONDENSERS, STEAM

Surface. An Interesting Modern Condensing Plant. Electrician, vol. 91, no. 2359, Aug. 3, 1923, pp. 117–118, 1 fig. Details of surface-condensing plant recently manufactured by Cole, Marchant & Morley to work in conjunction with a 12,000-kw. turbo-alternator at Leeds, England; condenser is constructed to meet special conditions and is arranged vertically, and designed to deal with 220,000 lb. steam per hour.

Heat Transmission in Surface Condensers between Steam and Water. C. H. Naylor. Beama, vol. 12, nos. 60 and 61, and vol. 13, nos. 63 and 64, Apr., May, July and Aug. 1923, pp. 206–214, 287–293, 37–44 and 104–108, 22 figs. Mathematical treatment of subject and experimental data.

Tubes. Condenser Tube Corrosion. R. Le Boyssou. Mar. Engr. & Naval Architect, vol. 46, no. 559, July 1923, pp. 267–268 and 270. Resume of English recommendations. Swiss experiments. Lasche's experiments; discussion of results. Abridged translation from Bulletin Technique du Bureau Veritas, June, 1923.

CONVEYORS

Gravity. Using Gravity to Solve Transportation Problems. Arthur L. Dahl. Indus. Management (N. Y.), vol. 66, no. 2, Aug. 1923, pp. 104–107, 8 figs. Advantages and economy of gravity conveyors.

Types. Mechanical Conveying (Nuove applicazioni nei transportatori meccanici). Fernando Barbacini. Industria, vol. 37, no. 8, Apr. 30, 1923, pp. 146–149, 10 figs. Describes belt, bucket, gravity, and other types of conveying, especially Simplex.

COÖPERATIVE SOCIETIES

Problems. Coöperation. Monthly Labor Rev., vol. 17, no. 1, July, 1923, pp. 230–243. Effect of strikes on cooperative stores; problems of cooperative marketing; cooperation in foreign countries.

CORES

Binders. Oil-Sand Cores and Binders. A. Campion and J. McEachen. Foundry Trade Jl., vol. 27, no. 356, June 14, 1923, pp. 474–476, 1 fig. Describes experiments carried out with river sand; gives valuation and cost of core binders and results of practical trials in foundry.

CORROSION

Iron and Steel. Recent Progress in the Study of Corrosion. J. Newton Friend. Birmingham Met. Soc.—Jl., vol. 8, no. 6, 1923, pp. 243–246 and (discussion) 246–250. Notes on phenomena of corrosion of iron and steel; theories of corrosion.

Water Deactivation, Control by. Water Deactivation. F. N. Speller. Engrs.' Soc. West. Pa.—Proc., vol. 39, no. 6, July 1923, pp. 189–201 and (discussion) 202–216, 8 figs. Describes development of means for control of corrosion by removal of free oxygen from water.

COUPLINGS

Flexible. A Flexible Coupling for Difficult Conditions. Power Engr., vol. 18, no. 208, July 1923, pp. 265–268, 9 figs. Describes Bibby steel coupling which provides solution to many difficult drives and is applicable to small and to very large transmissions.

Types. Couplings (Kupplungen). Maschinenbau, vol. 2, no. 19, June 30, 1923. Contains following articles: Spring-Band-Friction Couplings for the Drive of Large Rolling Mills, H. Asbeck, pp. G209–G210, 3 figs.; A New Split Coupling, Walter Patzke, pp. G210–G212, 5 figs.; Differential Coupling with Unlimited Regulation for Valve Regulation, H. Sondermann, pp. G212–G213, 3 figs.; Flexible Couplings, Max Pollak, 3 figs.

CRANES

Bridge, Wind Pressure on. Wind Pressure Is Bridge Hazard. C. O. Burton. Mar. Rev., vol. 53, no. 8, Aug. 1923, pp. 294–297, 6 figs. Ore, coal, and dock cranes often threatened with destruction during severe storms; new type of anemometer with recorder, which shows whether operation is safe or unsafe; automatic control developed.

Craneway, Concrete. Concrete Craneway at Hamburg. Carl Commentz. Concrete & Constructional Eng., vol. 18, no. 7, July 1923, pp. 469–473, 3 figs. Details of craneway of Reiherstieg-Schiffswerfte, Hamburg, for discharging and transporting ship plates and angles from railway wagons and barges.

Giant. The Esthetic Design of Giant Cranes (Die ästhetische Gestaltung der Schwerlastkrane, ein Beitrag zu ihrer Entwicklung). H. Benedict. Schiffbau, vol. 24, no. 40–41, July 4–11, 1923, pp. 630–633, 6 figs. Describes how good appearance and expediency are combined in design of several giant cranes.

Industrial. What It Pays to Know about Material Handling. W. T. Spivey and E. F. Church, Jr. Factory, vol. 31, no. 2, Aug. 1923, pp. 169–172, 208, 210, 212 and 214. Industrial cranes and derricks.

Shunting. 5-Ton Hand-Operated Shunting Crane. Ry. Gaz., vol. 39, no. 2, July 13, 1923, p. 59, 1 fig. Describes crane constructed by Stothert & Pitt, Ltd., designed to meet conditions calling for considerable load capacity; adapted for standard gage of 4 ft. 8½ in., and provides for a vertical range of lift hook between 7 ft. 6 in. below rail level and 13 ft. above.

CUPOLAS

Air Preheating. Air Preheating for Cupola Practice (Die Windvorwärmung fur den Kupolofenbetrieb). Carl Rein. Giesserei-Zeitung, vol. 20, nos. 15 and 16, July 1 and 15, 1924, pp. 279–284 and 301–305, 12 figs. Air preheating in front and in back of blower; critical discussion of cupola construction for preheated air during last 40 years; Schurmann cupola; author disbelieves in possibility of economy with preheated air in cupola.

Hammelrath. A New Cupola Design (Eine neue Kupolofen-Konstruktion). Zeit. fur die gesamte Giessereipraxis, vol. 44, no. 2324, June 16, 1923, pp. 133–135, 2 figs. Details of Hammelrath cupola with closed top, designed with view to better utilization of heat of exhaust gases and improvement in quality of casting.

Schuermann. Practical Experiences with the Schürmann Cupolas (Betriebserfahrungen mit dem Schurmann-Ofen). Chr. Gilles. Giesserei-Zeitung, vol. 20, no. 14, June 15, 1923, pp. 260–262, 4 figs. Comparison of results with Schurmann cupola with those of other types in same plant, showing reduction in coke consumption, and in sulphur absorption, and increase in manganese and iron loss. See also (discussion) in no. 15, July 1, 1923, pp. 284–288, 1 fig.

CUTTING TOOLS

Wear and Failure. Wear and Failure of Cutting Edges. J. E. Kayser. Birmingham Met. Soc.—Jl., vol. 8, no. 7, 1923, pp. 257–268, 8 figs. Conditions which enter into cutting and ultimate failure of cutting tools; experiments.

CYLINDERS

Machining, Airplane-Engine. Machining the Wright Aviation-Engine Cylinder Block. Fred H. Colvin. Am. Mach., vol. 58, no. 25, June 21, pp. 903–906, 11 figs. June 21. Problems in boring and tapping aluminum block for long, threaded steel sleeve; securing close contact for conducting heat of combustion.

Repairing Cast-Iron Steam. Repair of Mammoth Vertical Compressor Engine Cast Iron Cylinder. A. M. Candy. Power, vol. 58, no. 7, Aug. 14, 1923, pp. 242–244, 9 figs. Two cracks, 3½ and 5 ft. long, respectively, were successfully closed; welding operations cost about 10 per cent of price of new cylinder, besides eliminating long shutdown.

Steel Water Jackets. Welded Steel Cylinder Water Jackets. Glenn D. Angle. Aviation, vol. 15, no. 6, Aug. 6, 1923, pp. 148–152, 8 figs. Aluminum block vs. steel cylinder; foreign practice; types of sheet-metal welds; relative position of joints; experience of McCook Field; failures due to defective welding; cylinders that leaked.

D

DIE CASTING

Dies for. Cores and Slides for Die-casting Dies. Charles Pack. Machy. (N. Y.), vol. 29, no. 12, Aug. 1923, pp. 956–958, 3 figs. Gives example of die construction using slides and long cores for central hole.

Methods. Producing Die Castings for Owen Sound Plant. Herbert Chase. Can. Foundryman, vol. 14, no. 7, July 1923, pp. 20–22 and 27, 3 figs. Also Can. Machy., vol. 30, no. 1, July 5, 1923, pp. 49–51 and 74. Description of methods followed, the various types of machines employed and characteristics of various alloys used.

DIESEL ENGINES

Bethlehem. The New Bethlehem Diesel. Wes. Machy. World, vol. 14, no. 7, July 1923, pp. 215–217, 3 figs. Details of new type of two-cycle Diesel engine developed by Union plant of Bethlehem Shipbldg. Corp.; data on a three-cylinder 150-hp. engine, a single-cylinder engine, and a four-cylinder 50-hp. engine.

Developments. Diesels Discussed by Verein Deutscher Ingenieure. Motorship, vol. 8, no. 8, Aug. 1923, pp. 551 and 556, 1 fig. Review of some papers presented at Berlin meeting of German national engineering society, dealing with oil engine and problems of its development.

Double-Acting. The North British Two-Stroke Double-Acting Diesel Engine. Engineering, vol. 115, no. 3000, June 29, 1923, pp. 794–795, 4 figs. on supp. plate. Details of marine Diesel engine constructed by North British Diesel Engine Co., Glasgow.

Geared. Geared Diesel Engine for Ship Propulsion. Steamship, vol. 34, no. 409, July 1923, pp. 21–23, 1 fig. Describes 2200-b.hp. heavy-oil engine, consisting of four engines operating one propeller shaft through reduction gear.

Low-Pressure. Description of Low Pressure Burner in Bethlehem's Unusual Diesel Engine. H. H. Dunn. Mar. News, vol. 10, no. 3, Aug. 1923, pp. 61–62, 1 fig. New type involves less weight per hp., lower-hp. units, from 5 to 300 b.hp.; less compression, and lower exhaust temperature than present types of

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 134

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* Vogt, Henry Machine Co.

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* Edward Valve & Mfg. Co.
* Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
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Flour Milling Machinery
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Fly Wheels
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Forges
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* Vogt, Henry Machine Co.

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Northern Engineering Works
Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

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* Best, W. N. Furnace & Burner Corp'n
* General Electric Co.
Kenworthy, Chas. F. (Inc.)
Whiting Corp'n

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* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
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* Detroit Stoker Co.
* Riley, Sanford Stoker Co.

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Kenworthy, Chas. F. (Inc.)

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* O'Brien, John Boiler Works Co.

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naces, Hardening
Kenworthy, Chas F. (Inc.)

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Kenworthy, Chas. F. (Inc.)

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* General Electric Co.
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Detroit Electric Furnace Co.

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Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Precision Instrument Co. (Inc.)
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Gages, Rate of Flow
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Gears, Rawhide
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Gears, Speed Reduction
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Hangers, Shaft (Roller Bearing)
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Hard Rubber Products
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Diesel engines. See also article by A. J. Dickie in Pac. Mar. Rev., vol. 20, no. 8, Aug. 1923, pp. 385–38– 2 figs.

Maintenance. Regular Maintenance Schedules for Diesel Engines, J. L. Schneitter. Elec. World, vol. 82, no. 3, July 21, 1923, pp. 128–129. A maintenance outline, maintenance calendar and reports suggested; how such schedules should be developed.

Marine. Two-Stroke Diesel Engines (Motore "Diesel" a due tempi), A. Grecchi. Ingegneria, vol. 2, no. 5, May 1, 1923, pp. 125–128, 4 figs. Design and construction of marine Diesel engines, and their satisfactory performance on board ship.

DRILLING MACHINES

Multiple-Spindle. A New Multiple Spindle Drilling Machine. Eng. Production, vol. 6, no. 130, July 1923, pp. 324–326, 3 figs. Extreme simplicity and fact that it is designed for unit arrangement are features of new machine constructed by Messrs. Wilkins & Mitchell, Darlaston, England.

Railway-Disk-Wheel. The "Asquith" Duplex Disc Wheel Drilling Machine. Ry. Gaz., vol. 39, no. 2, July 13, 1923, pp. 60 and 63, 1 fig. Describes new tool, designed by William Asquith Ltd., of Halifax, for railway carriage and wagon shops.

DRILLS

Twist, Sharpening Machine for. Automatic Twist Drill Point-sharpening Machine. Machy. (Lond.), vol. 22, no. 564, July 19, 1923, pp. 501–503, 4 figs. Describes new type of machine placed on market by Herbert Hunt & Sons, Manchester, Eng., for sharpening automatically points of twist drills between $\frac{1}{4}$ in. and 2 in. in diameter.

DRYING

Time Tests. How Relative Drying Time May Be Approximated, Elliott B. Atwater and Roy A. Borkland. Chem. & Met. Eng., vol. 29, no. 6, Aug. 6, 1923, pp. 226–230, 7 figs. Derivation of set of useful curves that suggest method by which one of important problems of drying may be satisfactorily solved.

E

ECONOMIZERS

Cast-Iron Smooth-Tube. Cast-Iron Economizer with Smooth Tubes in Comparison with Those Made of Ribbed Tubes (Gusseiserne Ekonomiser mit glatten Rohren im Vergleich mit solchen, aus Rippenrohren hergestellt), M. R. Schulz. Warme, vol. 46, no. 20, May 18, 1923, pp. 211–212, 1 fig. Points out that flue-gas feed heaters with ribbed tubes, whether vertically or horizontally arranged, offer no advantage over smooth cast-iron feed heaters.

EDUCATION, ENGINEERING

Modern Tendencies. Modern Tendencies in Engineering Education, H. W. McKiel. Eng. Jl., vol. 6, nos. 7 and 8, July and Aug. 1923, pp. 309–312 and 353–356. Historical review of engineering education, analyzing curricula of various engineering colleges.

EDUCATION, TECHNICAL

Paper Industry. Training Technical Men for the Paper Industry, C. E. Libby. Paper Trade Jl., vol. 77, no. 4, July 26, 1923, pp. 49–52, 6 figs. Laboratories and equipment, library facilities, plan and scope of curriculum, pulp and paper courses, and summer employment, at New York State College of Forestry, Syracuse.

Refractories Industry. Technical Education in Relation to the Refractories Industry, G. W. Hefford. Ceramic Soc.—Trans., vol. 22, Part 2, Session 1922–23, pp. 205–210 and (discussion) 210–211. Necessity of education of workers; work that may be done by educational institution, and suggestions about parts industry may play.

ELECTRIC FURNACES

Ferroalloy. Improvements in Ferro-Alloy Electric Furnaces of High Power Input, B. D. Saklatwalla and A. N. Anderson. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 8, Aug. 1923, pp. 775–780, 3 figs. Deals with efficiency of power input in ferroalloy furnaces and discusses electrical factors to be considered in design of leads for achieving such efficiency; describes new system of regulation, whereby furnace temperature is kept constant by keeping energy input constant by means of true watt regulation.

Induction. High Frequency Induction Furnaces, Dudley Willcox. Fuels & Furnaces, vol. 1, no. 3, July 1923, pp. 159–162, 1 fig. Present status of the development of direct induction melting of small charges, and of melting in semi-conducting and conducting containers.

Non-Ferrous. Electric Furnaces for Melting Brass and Other Non-Ferrous Metals and Alloys, Verdon O. Cutts. Birmingham Met. Soc.—Jl., vol. 8, no. 1, 1923, pp. 16–30, 11 figs. Various methods of generating heat electrically, discussion of arc and induction types of furnaces, including resistance type; tables giving data of tests.

Steel. Electric Furnaces Extensively Employed in Germany, Godfrey L. Carden. Elec. World, vol. 82, no. 4, July 28, 1923, pp. 179–181, 3 figs. 70 per cent of steel works use them for high-grade steel; induction furnaces find wide application; results obtained from several installations.

ELECTRIC LOCOMOTIVES

Construction. Railway Electrification (A proposito dell'elettrificazione delle ferrovie), E. Stassano. Elettrotecnica, vol. 10, no. 13, May 5, 1923, pp. 275–279. Describes construction of a special locomotive in which motor is directly coupled to generator according to Heilmann system.

Midi Railway, France. Progress in Electric Traction on the Midi Railway (Les progrès de la traction électrique sur les chemins de fer du Midi), P. Leboucher. Technique Moderne, vol. 15, nos. 13 and 14, July 1 and 15, 1923, pp. 393–397 and 429–438, 33 figs. partly on supp. plates. Mechanical and electrical details of new 1000-hp. 1500-volt d. c. locomotives.

Mountain Express. The First Electric Mountain Express Locomotive of the Austrian Federal Railway (Die erste elektrische Gebirgs-Schnellzugs-Lokomotive der österr. Bundesbahnen), B. van Nes. Elektrotechnik u. Maschinenbau, vol. 41, no. 25, June 24, 1923, pp. 361–373, 29 figs. Details of 1 C-C 1 locomotives, electric part of which were built by Brown Boveri Works in Vienna and mechanical part by Floridsdorf Locomotive Factory.

Single-Phase. A Modern Swiss Electric Locomotive. Electrician, vol. 90, no. 2343, Apr. 13, 1923, pp. 387–390, 4 figs. Details of latest single-phase locomotive on Rhaetian Railway; maximum tractive effort 13,000 kg. at starting; maximum speed 45 km.p.h.

Twin Motors for Single-Phase. Twin vs. Separate Motors for Trunk Line Locomotives, with Special Reference to Single-Phase Locomotives with Separate Axle Drive (Zwillingsmotor oder Einzelmotor für Vollbahnlokomotiven, insbesondere Einphasenlokomotiven mit Einzelachsantrieb), J. Werz. Elektrotechnische Zeit., vol. 44, no. 28, July 12, 1923, pp. 660–664, 5 figs. Describes express locomotive of Swiss Federal Ry. equipped with twin motors and gives comparative data showing favorable weight conditions as compared with other single-phase locomotives.

ELECTRIC RAILWAYS

Overhead Trolley Suspension. Collecting 5400 Amp. at 58 M. P. H. Elec. Ry. Jl., vol. 62, no. 4, July 28, 1923, pp. 125–127, 4 figs. Describes new form of overhead trolley suspension used in recent tests carried out by Gen. Elec. Co. on its experimental track at Erie, Pa.; with a pantograph collector large amounts of current are drawn without difficulty; new type is modification of usual catenary construction.

Handling Heaviest Future Traffic Electrically, Ry. Rev., vol. 73, no. 3, July 21, 1923, pp. 94–96, 3 figs. New type of overhead trolley construction for electric locomotives which has greater capacity for current collection than any type now in use. Developed by General Electric Co.

ELECTRIC WELDING

Car for. An Electric Welding Car in St. John, N. B., C. L. Boxter. Elec. Ry. Jl., vol. 62, no. 3, July 21, 1923, pp. 85–87, 6 figs. Standard welding equipment has been mounted in a motor car to provide a portable unit suitable for track or shop use.

Metal-Working Industry. Electric Welding Used Widely in Metal Working Industry, P. P. Pipes. Iron Trade Rev., vol. 73, no. 6, Aug. 9, 1923, pp. 379–384, 8 figs. What is being done to make electric welding more reliable; description of resistance and arc welding and applications of each; examples and results of tests.

ELECTRIC WELDING, ARC

Cast-Iron Enameled Ware. Arc Welded Cast Iron Enameled Ware, O. H. Eschholz. Am. Welding Soc.—Jl., vol. 2, no. 7, July 1923, pp. 5–8, 5 figs. Cast-iron electrode welding; steel electrode welding; development.

Cylinders. Arc Welding Cylinders, B. K. Smith. Welding Engr., vol. 8, no. 7, July 1923, pp. 36 and 38, 3 figs. Use of special nickel-alloy electrode for first layer results in successful weld on iron casting.

Merits of System. Electric Arc Welding, Royal Mattice. Engrs. & Eng., vol. 40, no. 4, Apr. 1923, pp. 91–98, 10 figs. Economy of electric arc welding; stresses and strains; application of system; causes of failure.

Non-Ferrous Metals. Welding Non-Ferrous Metals, C. J. Holslag. Am. Welding Soc.—Jl., vol. 2, no. 7, July 1923, pp. 22–27, 1 fig. Details of various methods of arc welding various non-ferrous metals.

ELECTRIC WELDING, RESISTANCE

Apparatus. Recent Developments in Resistance Welding Field. Am. Weld. Soc.—Jl., vol. 2, no. 6, June 1923, pp. 17–34, 9 figs. Series of reports on progress in electric-resistance-welding field during the past year. Utilization of apparatus already developed.

ELEVATORS

Cable-Operation Records. Records of Elevator Cable Operation Show Wide Differences in Life of Cables, G. B. Garrison. Power, vol. 58, no. 4, July 24, 1923, pp. 124–127. Careful records kept of cable operation over period of 9 years; tests made on number of cables removed to determine their condition.

Operation. Vertical Transportation, H. D. James. Engrs.' Soc. West. Pa.—Proc., vol. 39, no. 3, Apr. 1923, pp. 79–89 and (discussion) 90–98. The elevator problem; machinery used for operating elevator car.

EMPLOYEES

Selection of Technical Graduates. Selecting and Placing Technical Graduates in the Westinghouse Organization, E. B. Roberts. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 207–211, 4 figs. How selection is made; plan followed in applying psychological tests.

EMPLOYEES' REPRESENTATION

Plans. Employee Representation Plans in Cleveland Monthly Labor Rev., vol. 17, no. 1, July 1923, pp. 47–50. Abstracted from report of Cleveland Chamber of Commerce based on study conducted by its committee on labor relations through its research department.

ENGINEERS

Licensing. Pro and Con Licensing. Min. & Met., vol. 4, no. 199, July 1923, pp. 351–355. Two articles: Mining Engineers Should Be Registered, by G. M. Butler; Registration not Burdensome to Mining Engineers, by George E. Taylor. Abstract of report of a canvass made by Min. & Met. Soc. of Am. of its membership during winter of 1920–1921, showing that licensing is distasteful to mining engineers.

F

FEEDWATER HEATERS

Locomotive. Gas Type Feed Water Heaters on Austrian Rys., John Rihosek. Ry. Rev., vol. 73, no. 3, July 21, 1923, pp. 96–102, 9 figs. Description by designer of details of preheater of waste-gas type recently placed in service on Austrian Nat. Rys. Saves 14 per cent fuel with injector operation; has 250 sq. ft. straight tube surface.

FIRE PROTECTION

Hydrants and Valves. Report of Committee on Hydrants and Valves. Nat. Fire Protection Assn.—Proc., May 8–10, 1923, pp. 145–148 and (discussion) 149–151, 3 figs. Tentative regulations for fire-department hose connections for sprinkler and standpipe systems.

Sprinklers. Report of Committee on Automatic Sprinklers. Nat. Fire Protection Assn.—Proc., May 8–10, 1923, pp. 114–122 and (discussion) 122–125, 3 figs. Proposed changes in sprinkler regulations; regulations for outside protection.

FIRECLAYS

Changes from Low-Temperature Burning. Some Changes Taking Place in the Low-Temperature Burning of Stourbridge Fire Clays, C. E. Moore. Ceramic Soc.—Trans., vol. 22, Part 2, Session 1922–23, pp. 138–158 and (discussion) 158–168, 10 figs. Results of experiments, dealing with contraction, porosity, specific gravity, hygroscopicity, solubility in acids, heating curves, and dehydration.

FLAME PROPAGATION

Explosives. The Propagation of Flame from a Spark, in a Closed Tube through a Homogeneous Inflammable Mixture, Oliver Coligny de Champfleur Ellis. Chem. Soc.—Jl., vol. 123–124, no. 728, June 1923, pp. 1435–1452, 13 figs. partly on supp. plates. Details of experiments conducted with object of studying progress of flame through an inflammable mixture as it is propagated from a spark near to closed end of a tube, other or "distal" end of which is open.

FLIGHT

Characteristics. Flight Characteristics. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 153, Aug. 1923, 8 pp. Account of test flights conducted at Adlershof (Germany) with object of accurately determining comparative performances of new types of airplanes under same conditions. Translated from Technische Berichte, vol. 3, no. 6.

Climbing. Thrust and Power Required in Climbing, Georg Koenig. Nat. Advisory Committee for Aeronautics, no. 152, Aug. 1923, 19 pp., 19 figs. It is shown that phenomena of climbing flight can be determined with sufficient accuracy, and represented very clearly, for all flight positions, by means of thrust diagram. Translated from Technische Berichte, vol. 3, no. 5.

Gliding. An Example of Static Gliding Flight (Ein Beispiel zum statischen Segelflug), J. Ackeret. Zeit. für Flugtechnik u. Motorluftschiffahrt, vol. 14, no. 11–12, June 26, 1923, pp. 86–89, 8 figs. Deals with static gliding flight on a steep coast. Simple relations are obtained for ceiling under given wind intensity, and it is shown that areas of possible static flight vary considerably with different wind intensities.

The Development of Soaring Flight in Germany. Aeroplane, vol. 25, no. 3, July 18, 1923, p. 76. Salient points from article by Gustav Lachmann on development of gliding and soaring in Germany.

The First Coastal Gliding Flight (Der erste Küsten-Segelflug), Werner v. Langsdorff. Motorwagen, vol. 26, nos. 16 and 17, June 10 and 20, 1923, pp. 245–246 and 263–266, 6 figs. Account and results of flights carried out on the Baltic coast under auspices of East Prussian Aeronautical Assn.; description of gliders.

Wind Factor. The Wind Factor in Flight: An Analysis of One Year's Record of the Air Mail, Willis R. Gregg and J. Parker Van Zandt. U. S. Dept. Agriculture, Weather Bureau. Reprinted from Monthly Weather Review, Mar. 1923, 51:111–125, 7 figs. Study of records shows that an allowance of 7 m.p.h. for wind must be made on westward flights; factors of safety; schedules; application to aircraft of different speeds.

FLOW OF AIR

Pipes. Air-Pressure Losses in Piping of Activated-Sludge Plants, H. L. McMillan. Eng. News-Rec., vol. 91, no. 5, Aug. 2, 1923, pp. 178–180, 1 fig. Comparative study of seven formulas with particular reference to pipe layout of large plant for Chicago Sanitary District; relation of pressure to pipe capacity.

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Alphabetical List on page 131

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The Air Resistance of Highly Compressed Air in Pipes (Ueber den Stromungswiderstand hochverdichteter Luft in Rohrleitungen), Max Wildhagen. Zeit. fur angewandte Mathematik u. Mechanik, vol. 3, no. 3, June 1923, pp. 181–197, 19 figs. Results of tests carried out in Kaiser-Wilhelm Inst. for Physical Chem. & Electrochem., Berlin-Dahlem.

FLOW OF FLUIDS

Viscous Fluids. The Resistance of a Cylinder Moving in a Viscous Fluid, L. Bairstow, B. M. Cave and E. D. Lang. Royal Soc. Lond. Philosophical Trans., vol. 223, A614, 1923, pp. 383–432, 8 figs. Lamb's solution, and extension of same; evaluation of x, y, and v; calculation of resistance; comparison of calculated and observed resistances; resistance of a flat plate.

FLOW OF GASES

Meters for. Accurate Bubble Meters for Very Small Rates of Gas Flow, Tyler Fuwa and G. A. Shattuck. Mass. Inst. Tech. Bul., vol. 58, no. 73, May 1923, 4 pp., 3 figs. Tests performed and experimental results.

FLOW OF WATER

Open Channels. Experiments on the Effect of Upper Channel Improvements upon the Downstream Flood Heights, LeRoy K. Sherman. West. Soc. Engrs.—Jl., vol. 28, no. 8, Aug. 1923, pp. 293–303 and (discussion) 303–318, 23 figs. Account of studies of hydraulics of non-uniform flow and wave movements in open channels, supplemented by laboratory experiments to verify correctness of some of theoretical or mathematical analyses; conclusions.

Pipes. The Flow Resistance of Pipes with Different Cross Section and Roughness Factor (Ueber den Stromungswiderstand von Rohren verschiedenen Querschnitts und Rauhigkeitsgrades), L. Schiller. Zeit. fur angewandte Mathematik u. Mechanik, vol. 3, no. 1, Feb. 1923, pp. 2–13, 10 figs. Results of measurements of resistances.

FLUE-GAS ANALYSIS

CO Determination. Determination of CO_2 Electrically. Fuels & Furnaces, vol. 1, no. 4, Aug. 1923, pp. 266–270, 6 figs. Operation of new meter dependent on fact that carbon dioxide has 40 per cent less heat conductivity than other constituents of flue gases.

FLUE GASES

Specific Gravity. The Specific Gravity of Flue Gases (Das spezifische Gewicht der Rauchgase), Georg Konig. Archiv fur Warmewirtschaft, vol. 4, no. 6, June 1923, p. 113, 1 fig. Method of calculation.

FOUNDRIES

Cost Systems. Simplifying Foundry Costs, Alfred Barnish. Foundry, vol. 51, nos. 12, 13 and 14, June 15, July 1 and 15, 1923, pp. 479–481, 532–535 and 565–567, 5 figs. June 15: Functions and needs of cost finding shown and evils of price cutting based on ignorance of costs are pointed out; basic terms defined. July 1: Explains order routine; production orders. July 15: Method of determining cost of metal at spout and of keeping records of supplies that are necessary in operating a castings plant.

Pits and Cases. Foundry Pits and Cases, James Edgar. Metal Industry (Lond.), vol. 23, no. 4, July 27, 1923, pp. 71–72, 5 figs. Describes pits or cases which are sunk to a level with foundry floor, for molding and casting large castings, of about 15 to 20 tons.

Railway Castings. Make Castings for Railroads, Pat Dwyer. Foundry, vol. 51, no. 15, Aug. 1, 1923, pp. 601–605, 8 figs. Modern foundry at Watervliet, N. Y., designed, erected and equipped to meet part of demand for steel castings incident to too severe operating conditions which characterize rail transportation.

Steel. New Steel Foundry Is Operating, John D. Knox. Iron Trade Rev., vol. 73, no. 7, Aug. 16, 1923, pp. 455–459 and 466, 9 figs. Electric steel foundry erected by Blackwood Electric Steel Corp. at Parkersburg, W. Va.; layout permits rapid progression of work through various stages of production; heavy machinery is direct-driven; steel castings annealed continuously.

FREIGHT HANDLING

Container System. Container Method of Handling Less-than-Carload Freight, Mail, Express and Milk, F. S. Gallagher. Ry. Club of Pittsburgh—Proc., vol. 22, no. 6, Apr. 26, 1923, pp. 117–126 and (discussion) 126–131, 2 figs. Advantages and uses of container method.

FUEL ECONOMY

Aspects. Some Practical Aspects of Fuel Economy, C. W. Mitman. Smithsonian Instn., vol. 76, no. 1, June 2, 1923, 19 pp., 2 figs. Domestic and industrial application of effective combustion; flue-gas analysis; air control; flue-gas temperature; limitations, costs, and advantages of furnace control, quality of coal.

FUELS

Utilization of. Interministerial Committee of Fuel Utilization—Ninth Report (Commission interministerielle d'utilization du combustible—Neuvieme rapport), J. Loiret. Revue de l'Industrie Minerale, no. 60, June 15, 1923, pp. 360–372. Technical and commercial questions on preparation of coal. From Journal officiel, Apr. 1, 1923.

[See also COAL; OIL FUEL; PULVERIZED COAL.]

FURNACES, CRUCIBLE

Gas-Fired. Gas-Heated Crucible and Oven Furnaces, Arthur Forshaw. Birmingham Met. Soc.—Jl., vol. 8, no. 3, 1923, pp. 65–85 and (discussion) 85–90, 1 fig. History of gas furnaces; points in construction and working of crucible furnaces, namely, linings shape, composition and life of linings, annealing of crucibles and influence of flame quality, corrosion of fluxes as cause of short pot life, output, metal and air preheating, gas consumption, and metal losses; consideration of oven furnaces, including description of various types, recuperation and regeneration, preheating and flame temperature, gas consumption, influence of quick heating and of loading before heating, care and manipulation.

FURNACES, HEATING

Continuous. Continuous Furnaces for Local Heating. Fuels & Furnaces, vol. 1, no. 4, Aug. 1923, pp. 250–252, 5 figs. To heat ends of set screws, bolts, valve stems, chisels and special sections, continuous furnaces with special conveyors are used to advantage.

FURNACES, HEAT-TREATING

Carburizing Sprockets. Carburizing and Hardening of Sprockets, C. B. Mitchell. Fuels & Furnaces, vol. 1, no. 4, Aug. 1923, pp. 241–244, 3 fig. Furnaces with well-insulated walls and special door flues are used for carburizing and "Hump" furnaces for hardening.

G

GAS ENGINES

Central-Station. The Efficiency of Gas Engines for Central Stations, M. S. Mason. Elec. Rev., vol. 92, no. 2379, June 29, 1923, pp. 1006–1007, 1 fig. Addenda to previous article on same subject, printed in Elec. Rev., Feb. 16, 1923, p. 244.

GAS PRODUCERS

Heat Balance. Heat Balance of Average Gas obtained in Test of Twelve Different Installations of Mechanical Producers, W. B. Chapman. Glass Industry, vol. 4, no. 7, July 1923, pp. 125–126. Suggestion for standard method of making heat balances.

GASOLINE

Motor, Surveys of. The Motor Gasoline Surveys of 1920 and 1921, N. A. C. Smith. U. S. Bur. of Mines—Tech. Paper, no. 328, 1923, 41 pp., 4 figs. Includes complete details of analyses of each sample collected in four surveys made in 1920 and 1921, tables and charts showing comparative results, and brief discussion of variations in quality developed by surveys.

GEAR CUTTING

Shapers. Mounting Gear Blanks on the Gear Shaper, A. Wilford. Eng. Production, vol. 6, no. 130, July 1923, pp. 314–317, 12 figs. Details of work-holding arrangements; holding hubless steel gears; methods for cutting internal and external plate-clutch disks; holding transmission gears; holding disk-clutch driving drum; etc.

GEARS

Automobile. What is the Most Logical Location for Non-Metallic Gears, T. C. Roantree. Automotive Industries, vol. 49, no. 6, Aug. 9, 1923, pp. 284–285, 3 figs. Author thinks it should be on camshaft, since this position permits use of metal hub, and noise is reduced to minimum, and dismounting would be accomplished more readily.

Teeth, Strength of. Factors Governing the Strength of Gear Teeth, Douglas T. Hamilton. Am. Mach., vol. 58, nos. 19, 22 and 25, May 10, 31 and June 21, 1923, pp. 681–685, 787–791 and 907–911, 22 figs. May 10: Materials and treatment for safe stress; selecting diametral pitch; how form and shape of gear tooth affect its strength. May 31: Inclination of tooth bearing to axis of gear; strength of helical gear teeth. June 21: Number of teeth and tooth ratio of gears in mesh; increasing strength of pinions having small number of teeth.

Method for Finding Lewis Factors, M. A. Durland. Machy. (N. Y.), vol. 29, no. 12, Aug. 1923, p. 958, 2 figs. Describes method which is believed to be distinct improvement over other methods referred to.

Testing. Gear-testing Machine at the National Physical Laboratory. Machy. (Lond.), vol. 22, no. 566, Aug. 2, 1923, pp. 579–583, 8 figs. Elements in gear teeth; wheel clamps; use of machine for straight spur gears; helical and bevel gears.

GRINDING

Metal, Dust in. The Dangers of Dust in Metal Grinding. Engineering, vol. 116, no. 3004, July 27, 1923, p. 104. Review of report on grinding of metals and cleaning of castings with special reference to effects of dust inhalation upon workers, issued by British Home Office.

H

HANDLING MATERIALS

Efficient, Plant Layout for. Here Is an Instance Where Material Moves with Production, G. A. Van Brunt. Indus. Engr., vol. 81, no. 7, July 1923, pp. 345–347 and 372, 5 figs. Describes layout of plant of Bates Expanded Steel Truss Co. at East Chicago, Ind., wherein material-handling devices tie production processes together so that entire plant functions as a complete unit.

HARDNESS

Testing, Instruments for. A New Hardness Tester, Iron & Steel of Canada, vol. 6, no. 7, July 1923, pp. 145–148, 5 figs. Describes Herbert pendulum hardness tester, a new instrument for testing hardness of substances ranging from lead to sapphire, and especially applicable to hardened steels; dispenses with all microscopic measurements and all difficult readings. See also Can. Machy., vol. 30, no. 2, July 12, 1923, pp. 14–15 and 36, 3 figs.

HEAT TRANSMISSION

Nusselt's Coefficients. Nusselt's Heat-Transmission Coefficients and the Scope of Their Validity (Ueber die Warmeubergangszahlen Nusselts und ihren Geltungsbereich), Alfred Schack. Stahl u. Eisen, vol. 43, no. 29, July 19, pp. 942–946. Mean cross-section temperature and mean true temperature of a liquid and gas current; accuracy of Nusselt's tests; measurement of heat volume; validity of Nusselt's formulas; gas radiation.

Pipes. Heat Transmission in Pipe with Variable Wall Temperature (Der Warmeubergang im Rohr bei veranderlicher Wandtemperatur), Heinrich Grober. Gesundheits-Ingenieur, vol. 46, no. 26, June 30, 1923, pp. 241–243, 5 figs. Calculation based on assumption that wall temperature along pipe varies according to a known law.

HEATING

Railway Buildings. Securing Economy in the Heating of Stations and Buildings, R. W. Noland. Ry. Eng. & Maintenance, vol. 19, no. 7, July 1923, pp. 278–280, 3 figs. Fundamental principles involved in various types of systems. Data collected by means of questionnaire sent to 100 representative railways of country.

HEATING AND VENTILATION

Auditoriums. Modern Method of Heating and Ventilating a Large Auditorium. Plumbers' Trade Jl., vol. 75, no. 1, July 1, 1923, pp. 22–24, 7 figs. Description of system of New York City Town Hall, on West 43d Street, heating and ventilating system with interesting recirculating, excellent fan blower.

Cost Analysis. How to Determine in Advance the Cost of a Heating and Ventilating System, James J. Maher. Heating & Vent. Mag., vol. 20, no. 7, July 1923, pp. 37–39. Emphasizes importance and necessity of a minute analysis of cost of a heating and ventilating system in a school building; suggests method by which such an analysis can be made, and gives practical application. From paper read before Nat. Assn. Pub. School Business Officials.

Large Buildings. Heating and Ventilation of a Large Building, Chas. L. Hubbard. Domestic Eng. (Chicago), vol. 104, no. 2, July 14, 1923, pp. 70–74, 7 figs. Describes system of John Hancock building in Boston.

HEATING, HOT-AIR

Unit Blast Heaters. The Unit Heater, Charles L. Hubbard. Power, vol. 58, no. 4, July 24, 1923, pp. 129–132, 6 figs. Discusses use of unit heater for warming large spaces.

Unit Blast Heaters, Charles L. Hubbard. Nat. Engr., vol. 27, no. 8, Aug. 1923, pp. 555–559, 12 figs. A recent development in heating equipment that has a number of advantages for certain classes of service; description of the various types, discussion of services to which they are adapted and points to be considered in their installation.

Wall Stacks and Heating Effect at Register. Wall Stack Size and Heating Effect at the Register, V. S. Day. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 29, no. 5, July 1923, pp. 407–412, 6 figs. Tests at Univ. of Ill. show interesting relation between wall stack size and heating effect at register in gravity warm-air furnace heating.

HEATING, HOT-WATER

Forced-Circulation. Heating with Condenser Circulating Water, John E. Williams. Am. Soc. of Heat. & Vent. Engrs.—Jl., vol. 29, no. 5, July 1923, pp. 399–405, 6 figs. Description of system at Chase Metal Works plants. Over 78 miles of pipe connected onto condensers in power house; hot water pumped through mill, returned to condenser, reheated and recirculated.

Forced Distributing Mains. Designing and Installing Distributing Mains for a Forced Hot Water Heating System. Plumbers' Trade Jl., vol. 75, no. 1, July 1, 1923, pp. 25, 28–29 and 31, 6 figs. Layout of underground piping; methods for insuring equal distribution of hot water to all buildings, sizes of forced hot-water mains.

HEATING, STEAM

Central-Station. The Problem of the Most Economical Operation of Central Heating Plants (Beitrag zur Frage des wirtschaftlichsten Betriebs der Zentralhiezungsanlagen), Paul Beck. Gesundheits-Ingenieur, vol. 46, no. 27, July 7, 1923, pp. 249–254, 4 figs. Results of tests show that interrupted operation offers considerable advantages over continuous operation; suggestions are made for obtaining good results continually; table is given showing coke savings with greater or lesser CO_2 content than 8 per cent in flue gases.

HOISTS

Intra-Factory Transportation. Hoists—an Important Link in Intra-factory Transportation, W. T. Spivey. Factory, vol. 31, no. 1, July 1923, pp. 24–27, 56–58, 60–62 and 64, 12 figs. Importance of hoists in factory; combination hoists and monorails; field of small hoist; portable using hoists as tiering machines; heavy, clumsy hoists not most economical.

HYDRAULIC TURBINES

Calculation. Calculation of Hydraulic Turbines (Sul

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CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 134

Meters, Steam
* Bailey Meter Co.
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* American Spiral Pipe Wks.
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* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
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* Crane Co.
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Piping, Ammonia
* Frick Co. (Inc.)

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(See Tubes, Pitot)

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(See Gages, Regulators, etc., Pressure)

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(See Engines, Pumping)

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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Calcolo delle turbine idrauliche). A. Cita. Industria, vol. 37, no. 10, May 31, 1923, pp. 186–188, 2 figs. Reaction curves and coefficients of peripheral velocity; formulas and calculations.

Draft Tubes. Tests of Five Models of Draft Tubes for Turbines. Eng. News Rec., vol. 91, no. 5, Aug. 2, 1923, pp. 182–184, 5 figs. Made with turbine and tubes geometrically similar to full-sized ones; new symmetrical type superior to older forms.

Pelton Wheels. The Evolution of the Tangential Impulse Turbine. Engineering, vol. 116, no. 3006, Aug. 10, 1923, pp. 163–164. Review of development.

HYDROELECTRIC PLANTS

British Columbia. A Brief Description of the Plant of the B. C. E. R. Company. Elec. News, vol. 32, no. 14, July 15, 1923, pp. 59–63, 10 figs. Details of Lake Buntzen, Stave Falls, and Jordan River hydroelectric plants operated by British Columbia Elec. Ry. Co.

California. The Don Pedro Hydroelectric Current. Charles W. Geiger. Power Plant Eng., vol. 27, no. 15, Aug. 1, 1923, pp. 770–773, 6 figs. Novel feature of plant in Stanislaus County, Cal., is that it is designed to operate on hand varying from 120 to 240 ft.

Italy. New Hydroelectric plant on the Alto Belice (Nuovo impianto idroelettrico sull' Alto Belice), Guido Cavallo. Ingegneria, vol. 2, no. 6, June 1, 1923, pp. 163–164, 3 figs. Describes plant on Alcantra river and plant on Cassibile river, and gives details of new power station at Palermo.

Mexico. Hydro-Electric Development in Mexico. Engineering, vol. 116, no. 3006, Aug. 10, 1923, pp. 166–168, 4 figs. Details of Tepexic power station located on Nexaca River; headworks; generating units; turbines; control; special protective devices.

North Wales. The Hydro-Electric Supply to Colwyn Bay (North Wales). T. Vaughan Hughes. Engineering, vol. 116, no. 3003, July 20, 1923, pp. 71–73, 7 figs. partly on supp. plate. Description of plants at Cwm Dyli, at foot of Snowden and at Dolgarrog, in valley of Conway.

Off-Peak Load Utilization. Hydrological Parallel Between Regions Producing and Regions Using Hydro-electric Power [Parallelo idrologico fra bacini producenti e bacini utilizzanti energie idroelettrica (caso delle bonifiche)]. Mario Giandotti. Elettrotecnica, vol. 10, no. 16, June 5, 1923, pp. 349–351. Development of hydroelectric power in Italy, and use of surplus power for irrigation purposes.

Switzerland. Amsteg Station in Switzerland. Henry L. Geissel. Elec. World, vol. 82, no. 5, Aug. 11, 1923, pp. 285–287, 3 figs. New power house for use on Gotthard electrification; details of design of station and of transmission system.

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ICE PLANTS

Electrification. Ice Plant Electrification. H. L. Lincoln. Jl. of Elec., vol. 51, no. 2, July 15, 1923, pp. 45–48, 3 figs. Development in ice-plant electrification, and advantages of this type of load to central station; estimates that proposed new construction will require an additional 12,000,000 kw-hr. during 1924.

IMPACT TESTING

Notched-Bar Tests. The Notched-Bar Test (Was haben wir an der Kerbschlagprobe?). M. Moser. Stahl u. Eisen, vol. 43, no. 29, July 19, 1923, pp. 935–942, 18 figs. Notched-bar test is said to be a working test. Working constants of unit of volume; speed of impact and working speed; shortened testing method; influence of different heat treatments on working constants and working speed; relations to tensile test.

INDUSTRIAL MANAGEMENT

Cost Control. The Province of the Controller. John B. Guernsey. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 197–200. Specific functions, duties, and relations.

Executives, Selection of. How Shall We Select Our Executives? E. H. Fish. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 183–184. Present method of selecting managers; sources from which to recruit executives; criteria for executive material.

Maintenance and Repairs. The Planning, Scheduling, and Dispatching of Maintenance and Repairs. Paul M. Atkins. Indus. Management (N. Y.), vol. 66, no. 2, Aug. 1923, pp. 78–83, 4 figs. How to avoid loss in maintenance and repair work.

Measurement of. The Measurement of Management. Frederick J. Schlink. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 173–178, 1 fig. Concrete possibilities from engineer's viewpoint.

Planning. A Production Plant That Prepares Ahead for Emergencies. M. Chapman. Factory, vol. 31, no. 1, July 1923, pp. 27–29, 1 fig. Regulating rushes and slumps in factory often overlooked; best practice is to plan for and meet emergencies systematically.

How the Walworth Company Looks Ahead. Joseph H. Barber. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 191–196, 5 figs. Anticipating customers' seasonal demands; how company plans production that inventories will carry in stock and in proper seasonal assortment only such material as customers are likely to want.

Practical Methods for Planning Work. William B. Ferguson. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 185–190, 10 figs. Repairing locomotives and freight cars in quantities.

Production Control. A $200,000 Saving in Factory Costs. H. L. Benedict. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 179–183, 9 figs. Advantages from controlled production in plant producing silver-plated ware.

Graphical Representation as an Aid in the Regulation and Control of Production (Die graphische Darstellung als Hilfsmittel zur Regelung und Ueberwachung der Produktion). A. Leyensetter. Maschinenbau, vol. 2, no. 19, June 30, 1923, pp. B229–B231, 4 figs. Necessity and advantages of careful production control; adaptability of graphic charts for this purpose and their requirements.

Profitable. Working Methods for Profitable Management. C. E. Knoeppel. Management Eng., vol. 4, nos. 1, 2, 3, 4, 5 and 6, Jan., Feb., Mar., Apr., May and June 1923, pp. 9–14, 93–100, 157–164, 245–250, 321–328 and 409–416, 14 figs. Jan.: General policies. Feb.: Organizing executives. Mar.: Coordinating sales, purchasing and manufacturing. Apr.: Costing the product. May: Controlling production. June: Simplifying conditions and operations. Concluded in Management & Administration, vol. 6, nos. 1 and 2, July and Aug. 1923, pp. 59–66 and 213–218, 3 figs. July: Rewarding workers. Aug.: Administering business.

Railway Shops. Shop Management Problems Are Discussed. Ry. Mech. Engr., vol. 97, no. 7, July 1923, pp. 490–494. Review of papers by H. T. Bentley, D. J. Mullen, and T. W. Demarest, before Am. Ry. Assn., dealing with men and management, handling materials, materials and manufacturing, depreciation cost accounting, wages and working conditions, constructive analysis of shop operation, establishing a production unit, importance of human factor, supervision, stabilizing employment, etc.

Routing. A Complete Plan for Simplifying Routing of Material in Process. C. B. Tyson. Factory, vol. 31, no. 2, Aug. 1923, pp. 180–182, 222, 224, 226, 228, 230, 232, 234, 236 and 238, 3 figs. Describes interdepartment shipping manifest plan which, it is claimed, saved large losses of parts and brought about better material control, improved scheduling, and greatly increased production in shipbuilding plant, where it was employed.

INDUSTRIAL RELATIONS

Trade-Union and Employers' Organizations. Industrial Relations. Int. Labour Rev., vol. 8, no. 1, July 1923, pp. 38–55. Trade-union organizations; employers' organizations; employment administration in U. S. Post Office Department.

INDUSTRIAL TRUCKS

Lift Type. Each Handling Is a Non-Productive Expense. Matthew W. Potts. Indus. Management (N. Y.), vol. 66, no. 2, Aug. 1923, pp. 69–75, 11 figs. Use of platforms and skids for various types of lift trucks.

INTERNAL-COMBUSTION ENGINES

Ignition Troubles. Ignition Troubles in Explosion Engines (Zundungsstorungen an Verpuffungsmotoren). H. Mertz. Motorwagen, vol. 26, no. 16, June 10, 1923, pp. 250–256, 15 figs. Suggestions for locating and remedying troubles.

Vibrations. Vibrations of Stationary Engines, Particularly Internal-Combustion Engines (Storende Fernwirkungen von ortfesten Kraftmaschinen, insbesondere Verbrennungsmaschinen). J. Geiger. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 30, July 28, 1923, pp. 736–739, 5 figs. Discusses disagreeable effects due to shaking of houses, shocks to nervous system, etc.; investigation, and measures for prevention of disagreeable vibrations; remedies for existing installations.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; GAS ENGINES; OIL ENGINES.]

L

LABOR

Wages and Hours. Wages and Hours of Labor. Monthly Labor Rev., vol. 17, no. 1, July 1923, pp. 92–111. Report of American Iron and Steel Inst. committee on 12-hour day; effect of 8-hour law in France; wages and hours of labor in specified industries in Japan, 1920 and 1921; wages and hours in New Zealand, 1909 to 1922.

LATHES

British Design. Present-Day British Lathe Design. Hubert Bentley. Am. Mach., vol. 59, no. 7, Aug. 16, 1923, pp. 245–246. Cause for embodying new features; three types of headstock in use; improvements in tailstock; provisions for feed changes and reverse motions.

Turret. Automatic Turret Lathes with Single-Disk and Overhead-Transmission Drive (Selbsttätige Revolverdrehbänke mit Einscheiben- und Deckenvorgelege-Antrieb). Der praktische Maschinen-Konstrukteur, vol. 56, no. 25–26, June 28, 1923, 3 pp., 1 fig. Details and operation of lathes made by Ludwig Löwe & Co.

LOCOMOTIVES

Boosters. Tender Booster Increases Tonnage 31 Per Cent. Ry. Mech. Engr., vol. 97, no. 7, July 1923, pp. 409–412, 8 figs. See also Ry. & Locomotive Eng., vol. 36, no. 7, July 1923, pp. 205–211, 10 figs. Details of demonstration by Delaware & Hudson of hauling capacity of Consolidation locomotive equipped with this device; design and construction of M. & L. type B booster.

The First Locomotive "Booster" in England. Ry. Gaz., vol. 39, no. 4, July 27, 1923, pp. 116 and 122, 6 figs. partly on pp. 117–119. Details of Doncaster-built "Atlantic" type locomotive No. 1419 which has recently left shops and is now running in regular service hauling heavy express trains, and booster with which it is equipped.

Efficiency. Increasing Efficiency of Modern Locomotives. Ry. Mech. Engr., vol. 97, no. 7, July 1923, pp. 523–525, 1 fig. Abstract of paper by Baltasar Martinez read before Am. Ry. Assn., on Draft Regulator and Low Degree Superheater, describing a new device that is being applied to Mexican locomotives, and discussion which follow.

Mileage, Increase of. Increasing the Average Mileage of Locomotives. D. F. Giles. Ry. Mech. Engr., vol. 97, no. 7, July 1923, pp. 513–518. Review of paper before Am. Ry. Assn., dealing with pooling and distribution of power, daily situation and report showing time in enginehouse, notification of dispatchers when engines will be ready, responsibility for utilization of power, prompt handling at enginehouses and terminals, accounting for mileage, heavy grades on New Mexico division, limiting factor in long runs, varying boiler waters, etc., including discussion by J. N. Nicholson and O. S. Jackson.

Mikado. European Mikado Type Express Passenger Locomotive. Charles R. King. Ry. & Locomotive Eng., vol. 36, no. 7, July 1923, pp. 219–222, 1 fig. Four-cylinder compound 2–8–2 type locomotive, in extended use abroad.

Mikado Type Locomotives for the D. & I. R. R. R. Ry. & Locomotive Eng., vol. 36, no. 8, Aug. 1923, p. 247, 1 fig. With aid of booster, tractive force is increased to 70,000 lb.

Mountain Type. Modern Passenger Locomotive Weighs 577,000 lbs., C. E. Brooks. Can. Machy., vol. 30, no. 3, July 19, 1923, pp. 18–19, 1 fig. Details of mountain-type locomotives being built at Kingston, Ont., for Can. Nat. Rys., known as U-1-2 class; many improvements in design; safety features preclude possibility of boiler explosion.

Pulverized-Coal-Burning. Pulverized Coal for Locomotives in Japan. Ry. Age, vol. 75, no. 4, July 28, 1923, pp. 161–162, 4 figs. Problem of burning low-grade in Isle of Taiwan solved by American equipment.

Saturated-Steam-Operated. 0–12–0 Type Locomotives for Bulgarian State Rys., Desider Ledacs Kiss. Ry. Rev., vol. 73, no. 4, July 28, 1923, pp. 126–127, 2 figs. Describes freight locomotive capable of hauling a 336-ton train up a 3.57 per cent grade at 11 m.p.hr., using saturated steam in cross-compound cylinders.

Tests, Germany. Tests with Steam Locomotives Since 1914 (Die Tätigkeit des Eisenbahnzentralamts und des Lokomotiv-Versuchsamts auf dem Gebiete der Versuche mit Dampflokomotiven seit 1914). H. Nordmann. Glasers Annalen, vol. 93, no. 1, July 1, 1923, pp. 1–7. Review of tests carried by German Railway Board and Locomotive Testing Bureau.

Valve Gears. Approximate Determination of Mass Pressures in Locomotive Valve Gears (Angenäherte Ermittlung von Massendrucken in Lokomotiv-Steuerungsgetrieben). Kurt Ewald. Der praktische Maschinen-Konstrukteur, vol. 56, no. 17, May 10, 1923, 8 pp., 18 figs. Graphic and numerical methods of calculation.

LUBRICATION

Ring. New Ring Lubrication for Axles of Railway Cars (Die neue Ringschmierung für Laufachsen von Bahnwagen). H. Duffing. Verkehrstechnik, vol. 40, no. 27, July 6, 1923, pp. 232–233, 1 fig. Describes Ossag ring lubrication and its use in application of lubricant known as Ossagol, a colloidal liquid grease made from specially prepared materials.

M

MACHINE SHOPS

British. Heavy Engineering Shop Practice. Machy. (Lond.), vol. 22, no. 566, Aug. 2, 1923, pp. 557–563, 11 figs. Darnall works of Davy Bros., Sheffield, England, makers of plant and equipment used in production of steel and heaviest class of manufactures; work-planning system; works-control board; standard tool data sheets, machine-tool equipment.

Holland. Machine Shops of Stork & Co. at Hengelo [De machinefabriek Gebr. Stork & Co. te Hengelo (O.)]. C. Beets. Ingenieur, vol. 38, no. 23, June 9, 1923, pp. 437–440, 6 figs. partly on supp. plate. Plan and layout of plant and buildings, including factory schools, machine shops and equipment, turbine department and turbine testing.

MACHINE TOOLS

Developments 1923. Principal Developments of the Present Year. L. C. Morrow. Am. Mach., vol. 59, no. 3, July 19, 1923, pp. 83–122. Semi-annual résumé of machines, tools and accessories described in Shop Equipment News of journal during first six months of 1923. Index of manufacturers.

Standardizing Fixture Track Systems. Standardizing Parts for Fixture Track Systems. W. F. Sandmann. Am. Mach., vol. 59, no. 4, July 26, 1923, pp. 127–130, 8 figs. Problem of standardizing track fixtures; usefulness in progressive multiple drilling, boring, tapping and reaming; predominating type of fixture; methods of indexing.

MALLEABLE IRON

Malleablizing Process. Some Experiments on the

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 134

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Deep Well, Axial
Midwest Engine Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

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Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Nordberg Mfg. Co.
Taber Pump Co.
* Worthington Pump & Machinery Corp'n

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Buffalo Steam Pump Co.
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* Goulds Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.
Taber Pump Co.

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American Fluid Motors Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

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Buffalo Steam Pump Co.
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* Lunkenheimer Co.
Midwest Engine Corp'n
Taber Pump Co.
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Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
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* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
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* Morris Machine Works
* Smidth, F. L. & Co.
Taber Pump Co.

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Taber Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
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Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
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Midwest Engine Corp'n
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Lammert & Mann Co.
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* Wheeler Cond. & Engrg. Co.
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International Filter Co.
* Scaife, Wm. B. & Sons Co.

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* Superheater Co.
Taylor Instrument Cos.

Pyrometers, Optical
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Pyrometers, Pneumatic
* Uehling Instrument Co.

Pyrometers, Radiation
Taylor Instrument Cos.

Racks, Machine, Cut
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.

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Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
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Link-Belt Co.

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* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

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* Brownell Co.
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* Frick Co. (Inc.)

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* Uehling Instrument Co.

Recorders, CO_2
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(See Instruments, Recording)

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* General Electric Co.
* Kieley & Mueller (Inc.)
Taylor Instrument Cos.

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(See Governors, Pump)

Regulators, Temperature
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Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

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(See Dies, Thread Cutting)

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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

Malleablising of Cast Iron. Foundry Trade Jl., vol. 28, nos. 361 and 362, July 19 and 26, 1923, pp. 59-61 and 76-79, 27 figs. From article in Stahl u. Eisen by P. Oberhoffer and J. Welter describing investigations carried out to determine part played by sulphur in malleablizing process. Results of tests; influence of temperature, manganese, and packing media; behavior of sulphur; iron and manganese sulphides; balling up of sulphide areas; etc.

MATERIAL HANDLING

Plant Transportation Survey. How to Make a Plant Transportation Survey, William Greaves. Indus. Management (N. Y.), vol. 66, no. 2, Aug. 1923, pp. 115-120, 3 figs. Detailed reports which materially assist in getting quick action.

MEASURING INSTRUMENTS

Short-Time-Intervals Measurement. A Method for the Accurate Measurement of Short Time Intervals, Harvey L. Curtis and Robert C. Duncan. Sci. Papers of Bur. of Standards (U. S.), No. 470, Apr. 26, 1923, pp. 17-38, 11 figs. Describes method whereby time between two events which occur less than a second apart can be determined with a high degree of accuracy; complete discussion of necessary conditions for best results, sources of error inherent in method, and accuracy which may be expected.

METALS

Calorizing. Calorizing and Oil Refining, E. W. Long. Oil Trade Jl., vol. 14, no. 8, Aug. 1923, pp. 54, 56, 58, 60, 62, 64, 66 and 68, 14 figs. What calorizing is and claims made for it; selection of metal to use for oil refining apparatus that is subjected to heat; heat action of calorizing, oxidation, comparative coke deposit in pressure-still tubes, carburization, etc.

Coloring. The Colouring of Metals, Alex. E. Tucker. Chem. & Industry (Soc. Chem. Industry—Jl.), vol. 42, no. 28, July 13, 1923, pp. 299T-302T. Describes processes invented by T. Rondelli and Q. Sestini for coloring iron and copper work, in which no reagents containing metallic salts are employed.

Elastic Limit. Some Thoughts on Elastic Limit, T. Baker. Birmingham Met. Soc.—Jl., vol. 8, no. 1, 1923, pp. 1-11 and (discussion) 11-15. Definitions of "elastic limit" and "limit of proportionality," emphasizes effect of internal strain on form of load-strain diagram, results of experiments.

Hardness, Temperature Effect. The Hardness of Metals as Affected by Temperature, Kiyosi Itô. Tôhoku Imperial Univ.—Science Reports, vol. 12, no. 2, Apr. 1923, pp. 137-148, 6 figs. partly on supp. plate. Details of Brinell hardness tests made on about 20 metals at different temperatures lying between -50 deg. to +150 deg. cent., and results obtained. 75th report of Research Inst. for Iron, Steel and Other Metals.

Hardness Tester. New and Simple Tester for Metals. Automotive Mfr., vol. 65, no. 3, June 1923, pp. 7-9, 2 figs. English device having advantages of simplicity, portability, accuracy, and quick action; used to test hardness of substances ranging from lead to sapphire, and especially applicable to hardened steels.

Stress, Effect on. A Physico-Chemical Interpretation of the Effects of Stress upon Metals, C. W. Yearsley. Birmingham Met. Soc.—Jl., vol. 8, no. 4, 1923, pp. 129-143, 1 fig. Relation between structure and strength; phenomena connected with permanent deformation; different causes of fracture; etc.

Testing. Some Observations on the Physical Testing of Metals, J. E. Malam. Birmingham Met. Soc.—Jl., vol. 8, no. 5, 1923, pp. 163-182, 9 figs. Observations on tensile, hardness (ball, cone and scleroscope) Erichsen, and machinability tests, especially as applied to examination of non-ferrous metals.

The Physical Properties and Testing of Thin Metal Strip, H. W. Brownsdon. British Non-Ferrous Metals Research Assn.—Bul., no. 9, July 1923, pp. 4-12, 5 figs. Details of method of conducting the various tests for determining physical properties of thin metal strip.

X-Ray Investigation. Röntgenographic Investigations of Worked Metals (Röntgenographische Untersuchungen an bearbeiteten Metallen), M. Polanyi, and K. Weissenberg. Zeit. fur technische Physik, vol. 4, no. 5, 1923, pp. 199-208, 15 figs. Investigation of crystal structure in metals to determine relative orientation of crystallites in relation to specific external parameter of aggregate.

MILLING

Driving-Box Wedges. Milling Forty Driving-Box Wedges in Eight Hours, Fred H. Colvin. Am. Mach., vol. 59, no. 5, Aug. 2, 1923, pp. 183-184, 6 figs. Special fixtures and methods at Burnham shops of Denver & Rio Grande R. R. which reduce locomotive repair cost; lapping piston rod in crosshead.

MOLDING METHODS

Sand-Throwing Method. The Sand-Throwing Method of Moulding, Daniel Sharpe. Foundry Trade Jl., vol. 28, no. 362, July 26, 1923, pp. 69-72, 9 figs. Early attempts; underlying principles; working details; transport considerations; jobbing work.

MOTOR BUSES

Bodies. Chelsea Bodies. Motor Transport (Lond.), vol. 37, no. 959, July 16, 1923, pp. 91-93, 8 figs. Design and construction of Chelsea bus and commercial vehicle bodies, with particular reference to a convertible passenger model suitable for all-season service.

Design and Maintenance. Buses Need Better Brakes and Universal Joints, E. B. Atchley. Automotive Industries, vol. 49, no. 6, Aug. 9, 1923, p. 281. Author, who is street-railway executive, suggests changes in design needed to make vehicles entirely suitable for use as adjuncts to electric lines.

Design and Maintenance of Buses, G. J. Shave. Power Wagon, vol. 31, no. 224, July 1923, pp. 33-34. Features to be considered in design; examples of efficient design.

What Are Fundamental Factors Which Govern Motor Bus Design? Alfred F. Masury. Automotive Industries, vol. 49, nos. 3 and 4, July 19 and 26, 1923, pp. 112-116 and 163-165, 3 figs. July 19: Considerations which govern general nature of chassis, size and character of engine, type of final drive, frame height, optimum design and arrangement of brakes and most favorable type of tire and wheel equipment. July 26: Spring design, dimensions for track and wheelbase, use of Hotchkiss drive, and body construction.

Steam. Q. E. D. Steam Motor Bus Uses Winslow Boiler. Automotive Industries, vol. 49, no. 3, July 19, 1923, p. 121, 2 figs. Data on new product developed by Steam Bus Syndicate of Chicago, having 2-cylinder compound engine; burner automatically controlled; air delivered by motor-driven blower; rapid acceleration and low fuel cost per mile claimed.

Types. Green Develops Type Z Bus. Motor Transport (N. Y.), vol. 29, no. 1, Aug. 1, 1923, pp. 8-9. Description of new bus of Yellow Coach Mfg. Co.; four wheel brakes, high speed engine, positively rigid frame, unusual spring suspension; special steering; polished radiator.

MOTOR TRUCKS

Military, British. 30-Cwt. Talbot Subsidy Motor Lorry. Engineering, vol. 116, no. 3006, Aug. 10, 1923, pp. 174-175, 12 figs. partly on p. 178 and supp. plate. New design to meet requirements of War Office specification.

Rear Axles. Rear Axles for Trucks, E. Favary. Soc. Automotive Engrs.—Jl., vol. 13, no. 2, Aug. 1923, pp. 151-166, 34 figs. Five types of final drive now in use on motor vehicles are stated to be (1) chain-and-sprocket, (2) bevel gear, (3) worm-gear, (4) double-reduction and (5) internal-gear; advantages of each type as emphasized by its maker are presented and commented upon, and same procedure is followed with reference to their disadvantages; bearing loads and shaft stresses of typical semi-floating and full-floating axles are calculated; various types of rear axle.

Six-Wheelers. Municipal Six-Wheelers. Motor Transport (Lond.), vol. 37, no. 957, July 2, 1923, pp. 28-30, 4 figs. Possibilities of tractor and semi-trailer combinations for increasing efficiency and economy of public-service transport work. Large load capacity, low ton-mile operating cost, and adaptability to many purposes are advantages of tractor lorry.

N

NICKEL STEEL

Low-Nickel. The Construction and Properties of Low Nickel Steels, J. Neill Greenwood. Birmingham Met. Soc.—Jl., vol. 8, no. 7, 1923, pp. 269-292 and (discussion) 293-297, 21 figs. Summarizes work done in recent years on nickel-carbon-iron alloys, and applies it to heat treatment of commercial nickel steels.

Properties. Invar and Related Nickel Steels. U. S. Bur. of Standards—Circular, no. 58, June 22, 1923, 93 pp., 48 figs. Compilation of data obtained during last 30 years by various investigators on different properties of nickel steels, with particular attention to invar, and reference to elinvar; results of investigations are presented in diagrammatic and tabular form. Bibliography.

NON-FERROUS METALS

Testing. Laboratory Control of the Manufacture of Water Works Plumbing and Gas Brass Goods, W. Everett Mueller. Am. Water Works Assn.—Jl., vol. 10, no. 4, July 1923, pp. 686-694, 5 figs. Deals with non-ferrous products; notes on experimental and control work done in laboratory of H. Mueller Mfg. Co., of Decatur, Ill., principally metal testing.

O

OIL ENGINES

Airless Fuel Injection. High-Pressure Oil Engine with Airless Fuel Injection (Hochdruckölmotor mit Einspritzung des Brennstoffes ohne Druckluft), K. J. E. Hesselman. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 27, July 7, 1923, pp. 658-662, 16 figs. Notes on fuel pump and fuel valve; actual process of spraying.

Lighting Plant. An Automatic Oil-Engine Light Plant, Colin K. Lee. Power, vol. 58, no. 7, Aug. 14, 1923, pp. 252-253, 5 figs. Describes installation of oil engines in small lighting plant in Missouri town.

OIL FUEL

Burners. The "Rotamisor" Liquid Fuel Burner. Petroleum Times, vol. 10, no. 236, July 14, 1923, pp. 57-58, 1 fig. Placed on market by Combustions Ltd., furnace designers and heat specialists.

Fuel Heaters. The Efficient Heating of Oil Fuel, Allen F. Brewer. Indus. Management (N. Y.), vol. 66, no. 1, July 1923, pp. 36-43, 16 figs. Advantages of efficiency and economy; factors to be considered in adopting method; prevalent types of oil-fuel heaters.

OPEN-HEARTH FURNACES

Gun Steel in Basic. Gun Steel in Basic Open-Hearth Furnaces. Engineering, vol. 116, no. 3004, July 27, 1923, pp. 119-120. Review of lecture by F. N. Pickett, giving account of work done by his firm in disposing of vast quantities of Allied and German ammunition left on dumps in Northern France and Belgium after termination of war; some 350,000 tons of material, consisting mainly of steel and other metals, has been rendered available for industrial purposes; methods employed.

OSCILLOSCOPES

Elverson. Studying Mechanisms in Motion, Peter Davey. Machy. (N. Y.), vol. 29, no. 12, Aug. 1923, pp. 927-932, 6 figs. Application of optical-mechanical apparatus, known as oscilloscope, for studying action of rapidly moving parts.

OXY-ACETYLENE CUTTING

Steel Piling Below Water. Cutting Steel Piling Below Low-Water Level, James Mitchell. Engineering, vol. 116, no. 3004, July 27, 1923, pp. 103-104, 6 figs. Describes cutting of steel piling by means of oxy-acetylene torch, operated from interior of cofferdam in which construction of pumping station is being carried out.

OXY-ACETYLENE WELDING

Oil Tanks. Proposed Method for Oxy-Acetylene Welding of Oil Storage Tank. Am. Weld. Soc.—Jl., vol. 2, no. 6, June 1923, pp. 10-16, 6 figs. Recommendations and specifications for welding of a 5000-bbl. tank by gas welding process; Report of Comm. on Welding of Storage Tanks of Am. Bur. of Welding, Am. Welding Soc.

Sheet Steel. Production Welding of Sheet Steel by the Oxy-Acetylene Process, J. L. Anderson. Am. Welding Soc.—Jl., vol. 2, no. 7, July 1923, pp. 9-21, 8 figs. Details of design and strength; methods.

Tanks. Tanking Welding. Welding Engr., vol. 8, no. 7, July 1923, pp. 24-25, 28-29 and 46, 10 figs. Welded tanks eliminate leakage losses; selection of material welding practices; preparation of material for welding; examples of tank welding.

P

PACKING

Selection and Installation. Gaskets and Packing, and How to Use Them, C. A. Underwood and J. R. Darnell. Power Plant Eng., vol. 27, no. 16, Aug. 15, 1923, pp. 813-816, 3 figs. Points out that substantial savings may be made by proper selection and installation.

PAINTS

Driers for. Efficiency of Driers for Various White Pigment Paints, H. A. Gardner and H. C. Parks. Paint Mfrs.' Assn. of U. S., Circular No. 186, July 1923, 19 pp. Description of work carried out to determine action of each of three widely used driers (lead, manganese, and cobalt) in various percentages when applied with the various opaque white pigments used in paint; table for determining exact quantity of any commercial drier to add to various paints to secure requisite percentage of metal based on oil content.

PATTERNMAKING

Twisted Pipe. Layout of a Twisted Pipe, George A. Jones. Boiler Maker, vol. 23, no. 7, July 1923, pp. 196-198, 5 figs. Method of obtaining true lengths, correct angle, and miter line of elbow.

PIGMENTS

White-Paint. A Relation Between the Brightness and Hiding-Power of White Paint-Pigments, A. H. Pfund. Franklin Inst.—Jl., vol. 196, no. 1, July 1923, pp. 69-78, 6 figs. Measurement of hiding power and brightness of given paints; describes a modified cryptometer; results of experiments.

PIPES

Stresses in. The Stresses in Walls of Straight and Curved Pipes with Circular Cross Section and with Constant Bearing at Bottom of Pipe (Rohrwandbeanspruchung gerader und gekrümmter Flüssigkeitsleitungen mit kreisförmigem Querschnitt und stetiger Auflagerung auf der Rohrsohle), Wilhelm A. Stark. Bauingenieur, vol. 4, no. 13, July 15, 1923, pp. 398-401, 1 fig. Lateral strength in pipe bends; method of static investigation employed.

PLATES

Elliptical, Deflection of. Calculation of the Bending of Freely Supported Elliptical Plates (Berechnung der frei gelagerten elliptischen Platte auf Biegung), B. G. Galerkin. Zeit. für Mathematik u. Mechanik, vol. 2, no. 2, Apr. 1923, pp. 113-117. Equation for bending in elliptical coördinates; equation of center surface; deflection in center; shearing force in crown.

Rectangular, Stress in. The Stress on Rectangular Plates, K. Sezawa. Engineering, vol. 116, no. 3006, Aug. 10, 1923, pp. 188-191, 10 figs. Calculation of distribution of stress worked out from author's own formula; results of experiments. Paper read before Japanese Soc. Naval Architects.

POWER GENERATION

Economic. Economic Generation of Power, L. L. Bowen. Power Plant Eng., vol. 27, no. 15, Aug. 1,

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 134

Sheet Metal Working Machinery
* Niagara Machine & Tool Works

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Sheets, Rubber, Hard
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Shelving, Metal
ManufacturingEquip.&Engrg.Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.
Weber, F. Co. (Inc.)

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp Wm. & Sons Ships & Engine Bldg. Co.
DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
* Hooven, Owens, Rentschler Co.
Lammert & Mann Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* Cleveland Worm & Gear Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mch. Co.
Link-Belt Co.
* Poole Engrg. & Mch. Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Fuller-Lehigh Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)

Steel, Alloy
* Union Drawn Steel Co.

Steel, Bright Finished
* Union Drawn Steel Co.

Steel, Cold Drawn
* Union Drawn Steel Co

Steel, Cold Rolled
Cumberland Steel Co.
* Union Drawn Steel Co.

Steel, Nickel
* Union Drawn Steel Co.

Steel, Open-Hearth
* Falk Corporation
* Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
* Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
* Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Keeler, E. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Stokers, Chain Grate
* Babcock & Wilcox Co
Combustion Engineering Corp'n
* Westinghouse Electric & Mfg. Co.

Stokers, Overfeed
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Sturtevant, B. F. Co.
* Westingnouse Electric & Mfg. Co.

Stools and Chairs, Metal
Manufacturing Equipment & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Switches, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Synchronous Converters
(See Converters, Synchronous)

Synchroscopes
Weston Electrical Instrument Co.

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Weber, F. Co. (Inc.)

Tachometers
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Tachoscopes
* American Schaeffer & Budenberg Corp'n

Tanks, Acid
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
* Graver Corp'n
* Hendrick Mfg. Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
New Haven Boiler Works (Inc.)
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
* Combustion Engineering Corp'n
* Graver Corp'n
* H.S.B.W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Machinery
* Franklin Machine Co.

Thermometers
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
Taylor Instrument Cos.

Thermometers, Distance
Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
Taylor Instrument Cos.

Thermostats
* Bristol Co.
* Fulton Co.
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co (Inc.)

Tie Tamping Outfits
* Ingersoll-Rand Co.

Time Recorders
* Bristol Co.

Tinsmiths' Tools and Machines
* Niagara Machine & Tool Works

Tipples, Steel
Link-Belt Co.

Tongs, Crane
Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Machinists' Small
* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
DuPont Engineering Co.

Torches, Hand
* Best, W. N. Furnace & Burner Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tractors, Industrial (Storage Battery)
Yale & Towne Mfg. Co.

Tractors, Turntable
Whiting Corp'n

Trailers, Industrial
Yale & Towne Mfg. Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
Whiting Corp'n

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
Whiting Corp'n

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Transmissions, Variable Speed
American Fluid Motors Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* American Schaeffer & Budenberg Corp'n
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
* Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* American Schaeffer & Budenberg Corp'n
* Crane Co.
* Sarco Co. (Inc.)

Treads, Stair (Rubber)
United States Rubber Co.

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n
Whiting Corp'n

Trucks, Industrial (Storage Battery)
Yale & Towne Mfg. Co.

Trucks, Trailer
Yale & Towne Mfg. Co.

Tubes, Boiler, Seamless Steel
* Casey-Hedges Co.

Tubes, Condenser
* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
* Goodrich, B. F. Rubber Co.
United States Rubber Co.

Tubing, Rubber (Hard)
* Goodrich, B. F. Rubber Co.

Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mch. Co.
Whiting Corp'n

Turbines, Hydraulic
* Allis-Chalmers Mfg. Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* Leffel, James & Co.
Smith, S. Morgan Co.
* Worthington Pump & Mchy. Corp'n

Turbines, Steam
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Ridgway Dynamo & Engine Co.
* Sturtevant, B. F. Co.
* Terry Steam Turbine Co.
* Westinghouse Elec. & Mfg. Co.

Turbo-Blowers
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Sturtevant, B. F. Co.

Turbo-Compressors
* Ingersoll-Rand Co.

1923, pp. 767–769, 1 fig. Modern methods of obtaining greatest thermal efficiency in operation of power plants.

PROFIT SHARING

Plans. New Profit Sharing Plan. Iron Age, vol. 112, no. 5, Aug. 2, 1923, p. 259. United Alloy Steel Corpn. adopts amendments suggested by experience.

Sharing Gains With Employees, W. L. Churchill. Management & Administration, vol. 6, no. 2, Aug. 1923, pp. 203–206. Examples of practical incentive plan.

PROTECTIVE COATINGS

Steel Parts. Protective Coating for Steel Parts (Including Zinc Plating). U. S. Army Air Service Specification, No. 98-24, 111-C, June 30, 1923, 4 pp. Specification covering general requirements for zinc plating and other approved methods for protection of steel parts against corrosion.

PULVERIZED COAL

Combustion. The Propagation of a Zone of Combustion in Powdered Coal, F. S. Sinnatt and L. Slater. Fuel in Sci. & Practice, vol. 2, no. 7, Aug. 1923, pp. 211–216, 3 figs. Describes researches having important bearing on problem of spontaneous combustion of coal.

Firing with. Methods of Industrial Heating by Means of Combustible Dusts Suspended in the Air (Considerations sur la technique du chauffage industrial par des poussières combustibles en suspension dans l'air), Henri Verdinne. Revue Universelle des Mines, vol. 17, no. 2, Apr. 15, 1923, pp. 81–95. Inflammability of dust suspended in air; fineness of pulverization and limit of velocity; combustion; etc.

Furnaces. A New Furnace for Pulverized Coal (Eine neue Kohlenstaubfeuerung), G. Petri. Archiv. fur Warmewirtschafte, vol. 4, no. 4, Apr. 1923, pp. 65–66, 4 figs. Purpose of design is economical burning of fuel which is slow to ignite or difficult to burn; part of fuel is finely pulverized and burned, where as another part is brought to grate without further preparation.

Furnaces and Pulverizers. New Arrangements and Experiences in the Field of Pulverized-Coal Firing (Neuere Einrichtungen und Erfahrungen auf dem Gebiete der Kohlenstaubfeuerungen), Friedrich Schulte. Wärme, vol. 46, nos. 26, and 27 June 29 and July 6, 1923, pp. 279–281 and 292–296, 13 figs. Preparation and firing of pulverized coal; design of pulverizers; furnace design; test results; furnaces for pulverized coal additions; future prospects.

Power Plants. Ashtabula Steel Co. Uses Pulverized Fuel. Power Plant Eng., vol. 27, no. 16, Aug. 15, 1923, pp. 807–812, 11 figs. Operating difficulties experienced at first have been eliminated; engine and boilers located in same room.

Preparation. Preparation and Utilisation of Pulverised Coal for Power Stations, Factories, and Steamships, James John Cantley Brand. Indus. Australian & Min. Standard, vol. 69, nos. 1803 and 1804, June 21 and 28, 1923, pp. 1014–1055. Economical use of slack coal; burning equipment; capacities of screw conveyors through 25 ft.; burners; combustion space; cost of preparation; spontaneous combustion; moisture absorption; etc. Abstract of paper before Instn. of Engrs., Australia.

Pulverizing Apparatus. A New Method of Powdered Fuel Firing. Foundry Trade Jl., vol. 27, no. 356, June 14, 1923, pp. 472–473, 1 fig. Describes "Atritor," a new apparatus for producing powdered fuel, combines advantages of drying and very fine pulverization.

PUMPS

Fire. Report of Committee on Fire Pumps. Nat. Fire Protection Assn.—Proc., May 8–10, 1923, pp. 136–141 and (discussion) 141–145. Proposed amendments to centrifugal pump regulations; tentative regulations for steam turbines driving centrifugal fire pumps.

Selection. Pump Selection, B. R. Vanleer. Am. Water Works Assn., vol. 10, no. 4, July 1923, pp. 559–570. General considerations in selection; first cost, dependability, durability, kind of water in use, total head, suction, efficiency, flexibility, priming and starting, capacity, speed, prime movers, etc.; advantages and disadvantages of various types of pumps.

R

RAILS

Joint Tests. Rail Joint Tests on the Detroit Municipal Railway. Elec. Ry. Jl., vol. 62, no. 3, July 21, 1923, pp. 89–95, 56 figs. Particulars of extended series of tests conducted by department of street railways in Detroit on seam-welded rail joints; comments on a large number of cast-welded joints removed during track rehabilitation.

RAILWAY ELECTRIFICATION

Argentina. Buenos Ayres Western Railway Electrification. Elec. Ry. & Tramway Jl., vol. 48, no. 1190, June 22, 1923, pp. 261–269, 12 figs. Details of power station, boiler-house plant, engine-room plant, cables, traction substations and their equipment, electric equipment of track, overhead-track equipment, rolling stock and car sheds.

France. Midi (France) Railway Electrification. Elec. Ry. & Tramway Jl., vol. 48, no. 1190, June 22, 1923, pp. 271–275, 7 figs. Details of further sections opened.

RAILWAY MANAGEMENT

Personnel. A Fundamental Weakness of Railroad Organization, Roy V. Wright. Pacific Ry. Club Jl.—Proc., vol. 7, no. 2, May 1923, pp. 5, 7, 9, 11, 13, 15, 17, 19–20 and (discussion) 21–27. Discusses personnel questions; educational clubs and employees' magazines, track workers, shop apprentices, trainmen, supervisory forces, selection of foremen, foremen's clubs, personnel departments, and employee representation.

Physical Statistics. Physical Statistics and Economical Operation, William H. Williams. Ry. Age, vol. 75, no. 6, Aug. 11, 1923, pp. 245–247. Difference between financial and physical statistics; suggestions for use of latter. Address before Ry. Accounting Officers Assn.

RAILWAY MOTOR CARS

Gasoline. Developments in the Motor Rail Car Field. Ry. Rev., vol. 73, no. 6, Aug. 11, 1923, pp. 201–204, 6 figs. Data on Chicago Great Western Ry. cars which compete successfully with bus competition; Meister car enables profitable short-line operation.

Power Plant of New Rail Car Located at Rear End. Automotive Industries, vol. 49, no. 6, Aug. 9, 1923, pp. 282–283, 2 figs. Narrow-gage design is to run at altitudes varying from 4500 to 5500 ft.; length, 32 ft.; width, 7 ft.; operated by one man; 4-cylinder engine.

Single-Phase. Single-Phase Railway Motor Car, Type Ce 4/6, of the Swiss Federal Railway (Die Einphasen-Motorwagen, Typ Ce 4/6, der Schweizer. Bundesbahnen). Schweizerische Bauzeitung, vol. 82, nos. 1 and 2, July 7 and 14, 1923, pp. 13–16 and 21–23, 17 figs. Characteristics and dimensions; mechanical part of car; oil-pump set; safety and measuring devices; possible train formations; special conditions with multiple control; operating results.

Steam. The "Sentinel" Steam Rail Coach. Ry. Gaz., vol. 38, no. 25, June 22, 1923, pp. 925–929, 11 figs. New type of car recently placed in service by Jersey Rys. & Tramways Ltd. Light construction and durability offer many possibilities for developing intermediate traffic, and amplifying ordinary facilities on branch and light-traffic lines.

RAILWAY OPERATION

A. R. E. A. Report. Economics of Railway Operation—Report of Committee XXI. Am. Ry. Eng. Assn.—Bul., vol. 24, no. 255, Mar. 1923, pp. 1043–1094. Effects of speed on cost of operation, p. 1045; methods of increasing traffic capacity of a railway, pp. 1046–1054, 4 figs.; methods of analyzing costs for solutions of special problems, pp. 1055–1076; feasibility and economy of through routing of solid trains and its effect upon capacity of terminals, pp. 1077–1083; methods for determination of proper allowances for maintenance of way expenses due to increased use and increased investment, pp. 1084–1094.

Efficiency. I. C. C. Statistics and Operating Efficiency, J. E. Slater. Ry. Age, vol. 75, no. 3, July 21, 1923, pp. 115–117. Analyzes statistical indices provided in reports made by railways to Interstate Commerce Commission, and points out certain fundamental truths which must be constantly borne in mind in use of these statistics.

Traffic Studies Show Need of Balanced Budgets, B. H. Mann. Ry. Signal Engr., vol. 16, no. 7, July 1923, pp. 289–294, 3 figs. Shows that operation of a freight-train district or subdivision is a mathematical problem and no longer a matter of mere energy; train movements scientifically scheduled cut down side-track delays and speed up service; laws of single-track capacity. Abstract from paper before Am. Assn. R. R. Supts. convention.

Electrified Railways. A Decade of the N. & W. Electrification. Elec. Ry. Jl., vol. 62, no. 6, Aug. 11, 1923, pp. 203–208, 9 figs. Operating experience of Norfolk & Western Ry. has led to minor changes in original designs; electrified mileage has been doubled since first project was completed; describes some of the methods of transportation and other operating departments.

Heavy Traffic. Handling Important Race Traffic on the Southern Railway. Ry. Gaz., vol. 39, no. 5, Aug. 3, 1923, pp. 154–159, 5 figs. How South Eastern & Chatham section of Southern Railway, by careful and preliminary scheduling of engine and train movements, etc., in full detail, enabled heavy and complex traffic of Derby Day to be operated with great exactitude, and without delay or confusion, while, at same time, meeting requirements of ordinary suburban and main-line traffic.

Long Runs. Extending Locomotive Runs on the Santa Fe, J. N. Nicholson. Ry. Rev., vol. 73, no. 3, July 21, 1923, pp. 83–88, 4 figs. Pooled power plus long runs result in doubling monthly mileage of coal- and oil-burning motive power.

Train Control. Big Four Tests I. E. C. Train Control Device. Ry. Age, vol. 75, no. 3, July 21, 1923, pp. 103–106, 7 figs. Description of device developed by Indiana Equipment Corp., Indianapolis, Ind., and its operation, and tests made on St. Louis division of Cleveland, Cincinnati, Chicago & St. Louis at Avon, Ind.

Big Four Tests I. E. C. Train Control. Ry. Signal Engr., vol. 16, no. 8, Aug. 1923, pp. 327–329, 7 figs. Ramp device with split air reduction developed by Indiana Equipment Corp., Indianapolis, Ind., tried in freight service to determine effect on tonnage trains.

Frisco Train Control Tests. Ry. Signal Engr., vol. 16, no. 7, July 1923, pp. 284–286, 7 figs. Describes test installation of automatic train-control system of Nat. Safety Appliance Co. on St. Louis-San Francisco line; intermittent inductive type including stop and speed-control indication incorporated with existing single-track signaling.

The Richards Automatic Train Control System. Ry. Rev., vol. 73, no. 4, July 28, 1923, pp. 135–139, 4 figs. Is of intermittent, magnetic-induction type, providing continuous indications in locomotive cab; details of construction and operation.

RAILWAY REPAIR SHOPS

Boiler Shops, Trestles for Use in. Trestles That Have Been Found Useful in Boiler Shops, James F. Hobart. Boiler Maker, vol. 23, no. 7, July 1923, pp. 192–194, 10 figs. Steel and wood trestles made from materials in shop to meet every emergency.

Cost Accounting. Practical Plan for Analyzing Account No. 314, Laurence Richardson. Ry. Rev., vol. 73, no. 4, July 28, 1923, pp. 133–135, 2 figs. Expedient for analyzing car-repair costs by requiring an accounting for all repair charges for a sample number of each type of car in service.

Freight-Car. Unit System of Repairing Freight Cars. Ry. Mech. Engr., vol. 97, no. 8, Aug. 1923, pp. 568–572, 8 figs. Good results secured at Readville shops with unit or station-to-station method.

Labor, Specifications for. Specifications for Labor. Elec. Ry. Jl., vol. 68, no. 3, July 21, 1923, pp. 97–101, 3 figs. Power and equipment department of Connecticut Company has drafted specifications for work required in car overhauling and periodic inspections; it also has a simple system for tabulating and charting essential data.

Locomotive. New Burlington Locomotive Shop at Denver, A. H. Ostberg. Ry. Mech. Engr., vol. 97, no. 7, July 1923, pp. 485–489, 3 figs. $2,500,000 project will employ 750 men; will turn out 200 classified and 50 running repairs a year; details of plant and its equipment.

RAILWAY SHOPS

Locomotive. Erecting Shop Practice at Battle Creek, M. H. Westbrook. Ry. Mech. Engr., vol. 97, no. 8, Aug. 1923, pp. 584–591, 23 figs. Efficient devices and methods which facilitate erecting work at Grand Trunk locomotive shops.

Southern Pac., Sacramento. The Sacramento Shop of the Southern Pacific Railway, Fred H. Colvin. Am. Mach., vol. 59, no. 2, July 12, 1923, pp. 43–44, 3 figs. Railway shop with its own rolling mill; welding locomotive frames with oil burners and air hammers.

RAILWAY SIGNALING

Colored-Light Signals. C. B. & Q. Installs New Light Signals. Ry. Signal Engr., vol. 16, no. 8, Aug. 1923, pp. 323–326, 10 figs. Also Ry. Age, vol. 75, no. 4, July 28, 1923, pp. 159–160, 5 figs. Details of home and distant colored-light automatic block signals just completed on Chicago, Burlington & Quincy between Hannibal, Mo., and Louisiana.

Interlocking. A Notable Interlocking Replacement. Ry. Gaz., vol. 39, no. 3, July 20, 1923, pp. 89–90, 8 figs. on pp. 91–92. How permanent way and signal departments of Great Eastern Section of Lond. & North Eastern Ry. replaced a complicated 136-lever interlocking mechanism at Liverpool Street station in 32 hours without hand signaling or interruption of traffic.

Three-Position Semaphore Arms. Mechanical Manipulation of the Three Position Semaphore Arms on the Belgian State Railways, R. Minet. Int. Ry. Congress—Bul., vol. 5, no. 7, July 1923, pp. 619–695, 83 figs. Transmission of power by double wire for working signals on Belgian State Rys.; semaphores of new method of signaling.

Train Operation in Either Direction. Train Operation Against Traffic. Ry. Signal Engr., vol. 16, no. 8, Aug. 1923, pp. 330–334, 6 figs. Signaling double track for movements in either direction, on Cleveland, Cincinnati, Chicago & St. Louis, allows idle stretches to be utilized to advantage.

RAILWAY TRACK

Elevation of. Track Elevation at Aurora, Illinois. Ry. Rev., vol. 73, no. 6, Aug. 11, 1923, pp. 191–198, 11 figs. Details of methods used on project now nearing completion which relieves both city and railroad from burdensome conditions.

Load Analysis. An Analysis of Special Trackwork Loads, M. Bernard. Elec. Ry. Jl., vol. 62, no. 5, Aug. 4, 1923, pp. 173–174, 7 figs. Analysis showing location of points where impact, the most serious factor, is greatest; special examples showing where excessive wear and impact take place.

RAILWAY YARDS

Gravity Freight Yard. New Gravity Freight Yard at Denison, Tex.; M.-K.-T. Ry. Eng. News-Rec., vol. 91, no. 6, Aug. 9, 1923, pp. 221–224, 6 figs. Extensive layout in cutoff line has daily capacity for 80 trains and classifying 2000 cars; two hump tracks have different grades; separate departure yards.

RAILWAYS

Never-Stop Train System. The "Never-stop" Train System. Engineer, vol. 136, no. 3526, July 27, 1923, pp. 94–95, 7 figs. Notes on scheme devised by Yorath Lewis in 1911 for central-area passenger service; "never-stop" railway is being built at Southend-on-sea, so arranged that it will demonstrate completely ability of system to change gradient and take curves of short radius; cars travel continuously around circuit.

Trans-Siberian. The Trans-Siberian Railways, Benjamin O. Johnson. Worcester Polytechnic Inst.—Jl., vol. 26, no. 4, July 1923, pp. 179–185. Deals with transportation or manufacture of ton-miles. Describes this Russian railway and develops peculiarities in its operation as compared with American practices and methods, with view to what it may contribute to

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Alphabetical List on page 134

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RAPID TRANSIT

Chicago. Chicago City Council Plans Unified Transit System. Eng. News-Rec., vol. 91, no. 3, July 19, 1923, pp. 104-105, 1 fig. Abstract of report and recommendations on physical plan for unified transportation system.

REFRIGERATING MACHINES

Absorption. The Absorption Machine. C. O. Fehl. Refrig. World, vol. 58, no. 7, July 1923, pp. 16-18. Describes modern refrigerating machine of this type and its operation; causes to which undercapacity can usually be attributed.

REFRIGERATION

Improvements. Progress in the Refrigerating Industry. Neuere Arbeiten auf dem Gebiete der Kälteindustrie). Bruno Sinnmersbach. Wärme- u. Kälte-Technik, vol. 25, nos. 12, 13 and 14, June 15, July 1 and 15, 1923, pp. 95-97, 103-105 and 114-115. Review of recent processes and patents.

Methyl Chloride. Methyl Chloride Refrigeration. H. Herter. Refrig. World, vol. 58, no. 7, July 1923, pp. 13-16. Relative gas volumes to be pumped when using either ammonia or methyl chloride (piston displacement and horsepower per ton of refrigeration with ammonia and methyl chloride gas compressors.

RESEARCH

Industrial. Industrial Research. C. E. Skinner. West Soc. Engrs.—Jl., vol. 28, no. 7, July 1923, pp. 279-292. General effect of research; organizations, methods and examples; insulation research; transformer oil; turbo-alternators; ventilation of electrical apparatus; steel for magnetic purposes; molded materials; high plating; etc.; cooperative research.

RIVETING

Machines for. The Design of Boat Type Portable Hydraulic Riveting Machines. Machy. (Lond.), vol. 22, no. 564, July 19, 1923, pp. 501-509, 11 figs. Requirements; cylinder details, including main and return cylinders; leathers; frames; working valve; etc.

Problems. The Problem of Riveting (Zum Vernietungsproblem). R. Maillart. Schweizerische Bauzeitung, vol. 82, no. 4, July 28, 1923, pp. 43-45, 6 figs. Author formulates a rule of construction.

ROLLING MILLS

Electric Heating of Rolls. Electric Heating of Finishing Rolls of Sheet and Tin Mills. Gordon Fox. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 7, July 1923, pp. 254-268, 5 figs. Points out that same advantages which accrue to electric heating in many other operations also occur in this application.

Electrically Driven. A Large Electrical Reversing Rolling Mill Drive. Iron & Coal Trades Rev., vol. 107, no. 2886, July 13, 1923, pp. 48-49, 5 figs. Describes electrical equipment of Societe Anonyme des Ateliers of Angleur, Liege, Belgium, supplied by Brown, Boveri & Co.

New Mill at the Works of Brown Bayley's Steel Works, Limited, Sheffield. Iron & Coal Trades Rev., vol. 107, no. 2888, July 6, 1923, pp. 1-2 and 8 figs. on pp. 17-20. Modern rolling mill consisting of an electrically driven 14-in. three-high rolling mill fitted with special mechanical handling equipment, etc. Arrangement for conveying billets to rolls; feed rollers and manipulating gear; conveying rolled material.

S

SAND MOLDING

Nature of. Molding Sand—Size of Grain Secondary to Purity. F. W. Best. Can. Foundryman, vol. 14, no. 7, July 1923, pp. 21-25. Basis of good sand should be pure silica; unsatisfactory sands made valuable by proper blending.

Permeability. Testing Permeability of Molding Sand. Foundry, vol. 51, no. 14, July 15, 1923, pp. 587-588, 1 fig. Describes method for testing permeability of molding sand presented at convention of Am. Foundrymen's Assn.; tempering important; calculation of permeability.

SAWS

Cold. A New Metal Sawing Machine. Iron Age, vol. 112, no. 4, July 26, 1923, p. 203, 1 fig. Cold saw with capacity for 12-in. square bars; hardened gears used; convenient control. See also Iron Trade Rev., vol. 73, no. 4, July 26, 1923, p. 259, 1 fig.

SCREW THREADS

Involute, Gaging. The Gaging of Involute Threads. Henry E. Merritt. Machy. (Lond.), vol. 22, nos. 549, 551 and 565, Apr. 5 and 19 and July 26, 1923, pp. 11-13, 79-81 and 525-528, 13 figs. Apr. 5 and 19: Gaging straight-spur teeth by tooth caliper, and by plug or wire method. July 26: Geometry of finish-ground worm thread; fundamental dimensions; application of some of the properties of thread surface to gaging problems.

Measuring Devices. Thread Measuring Devices. B. M. W. Hanson. Machy. (N. Y.), vol. 29, no. 12, Aug. 1923, pp. 946-948, 4 figs. Describes different devices with special reference to lead-measuring machine.

SEAPLANES

Curtiss Navy Racer. Trials of American Schneider Cup Entry. Aviation, vol. 15, no. 7, Aug. 13, 1923, p. 191, 1 fig. Curtiss navy racer powered with Curtiss D12 engine makes new world's seaplane speed record.

SOLIDS

Rupture of. The Theory of Rupture According to A. Griffith (Zur Bruchtheorie von A. Griffith). Karl Wolf. Zeit. für angewandte Mathematik u. Mechanik, vol. 3, no. 2, Apr. 1923, pp. 107-112, 3 figs. Derivation of formulas based on Griffith's work on the phenomena of rupture and flow in solids.

SPRINGS

Leaf. New Spring Design Makes Master Leaf Thinner Than Shorter Plates. Automotive Industries, vol. 49, no. 3, July 19, 1923, pp. 117-120, 14 figs. Conventional practice revised to reduce probability of breakage; leaves are tapered and nip is kept at a minimum; construction of Landau high-endurance product claimed to insure uniform distribution of stress throughout mass of material.

STACKS

Flues and. Stacks and Flues. R. H. Barber. Combustion, vol. 9, no. 2, Aug. 1923, pp. 160-161 and 191. Steel, brick, concrete and combination stacks; stack proportions; flues. Report presented by N. E. L. A. Prime Movers Committee.

Steam-Boiler. Diameters and Heights of Stacks for Steam Boilers. E. C. Fisher. Boiler Maker, vol. 23, no. 7, July 1923, pp. 201-206 and 212, 6 figs. Assumptions for stack calculations. Report of subcommittee of joint Am. Boiler Mfrs.' Assn. and Stoker Mfrs.' Assn. committee read at convention of Am. Boiler Mfrs.' Assn.

STANDARDS

German N. D. I. Report of the German Industrial Standards Committee (Normenausschuss der Deutschen Industrie), vol. 6, no. 19, June 30, 1923, pp. N127-N138, 11 figs. Tentative proposals for testing of steel and iron workshop material, and Brinell hardness test. Proposed standards for punched wrenches, foundation blocks, testing of steel and iron workshop material; silver and hard solder; pipe molds.

STEAM ACCUMULATORS

Ruths. The Ruths Steam Accumulator (Der Dampfspeicher von Dr. Ruths). W. Heepke. Feuerungstechnik, vol. 11, no. 19, July 1, 1923, pp. 193-196, 3 figs. The Halpin idea and the Ruths accumulator; calculation of steam output, water content, dimensions and weight of storage tank; regulation of accumulator in accordance with pressure diagram; arrangement of accumulator in plant; technical and economic advantages. Based on article by Fritz Krauss in Zeit. der Dampfkesseluntersuchungs- u. Versicherungsgesellschaft.

Types. Steam Accumulators. M. Emanaud. Chem. & Met. Eng., vol. 29, no. 4, July 23, 1923, pp. 149-152, 10 figs. General considerations; discharge of accumulators; comparison of the types. From Tech. nique Moderne, Apr. 1923.

STEAM-ELECTRIC PLANTS

Australia. The Morwell (Australia) Electric Power Scheme. Elec. Times, vol. 64, no. 1655, July 5, 1923, pp. 3-7, 11 figs. Details of generating station now being erected, which will have initial capacity of over 60,000 kw., capable of extension to 100,000 kw.; turbine house and equipment.

Edinburgh. Electricity Supply at Edinburgh. Elec. Rev., vol. 93, nos. 2381 and 2382, July 13 and 20, 1923, pp. 59-62 and 101-103, 13 figs. Details of Portobello generating station and equipment, including three turbo-alternators manufactured by Brown, Boveri & Co., Switzerland, each having continuous maximum rating of 12,500 kw. See also Elec. Times, vol. 64, no. 1656, July 12, 1923, pp. 29-32, 6 figs.

Edison Elec. Illuminating Co., Boston. Some Engineering Features of the Weymouth Station of the Edison Electric Illuminating Co. of Boston. L. E. Moultrop and Joseph Pope. Am. Inst. Elec. Engrs.—Jl., vol. 42, no. 8, Aug. 1923, pp. 799-808, 8 figs. Present construction covers installation of two 32,000-kw. generating units with three 1975-hp. boilers, operating at 375-lb. steam pressure and 700 deg. fahr.; details of feedwater heating and switching arrangement.

Heat Balance. Power Station Heat Balance. G. G. Bell. Combustion, vol. 9, no. 2, Aug. 1923, pp. 148-156 and 194, 7 figs. Sources of power for electrically driven auxiliaries; variable-speed auxiliaries; jet condenser, closed and open heater; evaporators for preparing make-up water; stage heating of condensate. Manufacturers' statement. Report relative to combustion accessories from N. E. L. A. Prime Movers Committee report.

Signal Systems for. Signal Systems for Power Stations. C. D. Gray and M. M. Samuels. Elec. World, vol. 82, no. 5, Aug. 4, 1923, pp. 225-228, 6 figs. Recent practice in providing for various alarm signals inside and outside switchboard room and for operating instructions as well as general communication; not too elaborate but still adequate.

Tobacco Works. How Reliability is Secured in a Tobacco Works. Power Engr., vol. 18, no. 208, July 1923, pp. 249-256, 16 figs. Describes main power-plant features of Bristol factories owned by W. D. & H. O. Wills, a branch of Imperial Tobacco Co. (of Great Britain and Ireland) Ltd.

STEAM METERS

Orifice Type. A New Orifice Steam Meter (Ein neuer Mündungsdampfmesser). H. Kraushaar. Braunkohle, vol. 22, no. 11, June 16, 1923, pp. 161-167, 9 figs. Advantages of orifice over float-type meters; and description of type developed by author.

STEAM POWER PLANTS

Design. A South Dakota Power Plant. W. F. Schaphorst. Nat. Engr., vol. 27, no. 8, Aug. 1923, pp. 350-352, 5 figs. Comparison of old and new methods in power plant design; describes plant of State College of South Dakota, designed to burn lignite coal, which has not proved very successful; data on municipal heating.

High-Pressure. Improving the Efficiency of Steam Plants with Very High Pressure (Die Verbesserung der Wirtschaftlichkeit im Elektrizitätswerksbetrieb durch Erhöhung von Druck, Ueberhitzung und thermodynamischem wirkungsgrad der Dampfturbine). H. Gleichmann. Siemens-Zeit., vol. 3, no. 6, June 1923, pp. 245-250, 3 figs. Author assumes existing steam plant, operating at 16 atmos. pressure, and investigates theoretical possibilities and efficiencies resulting from increase of boiler pressure to 101 atmos., driving with this high pressure a turbine, exhaust of which would drive under pressure of 16 atmos. the existing turbine. Efficiency charts show effect of intermediate superheater between two turbines and financial gain achieved with this system.

Management. Power Problems of Vital Interest to Executives. James T. Beard. Indus. Management (N. Y.), vol. 65, nos. 5, 6 and vol. 66, no. 1, May, June, and July, 1923, pp. 268-273, 7 figs., 369-374, 8 figs., pp. 46-52, 8 figs. May: Feedwater treatment. June: Possibilities of pulverized coal as fuel. July: Keeping tabs on combustion.

Office Building. The Power Plant and Its Problems. Harold R. Hilton. Nat. Engr., vol. 27, no. 8, Aug. 1923, pp. 361-363. Practical discussion on chief items of mechanical equipment in office buildings; special stress upon those items of equipment that most closely affect operating expense.

STEAM TURBINES

Foundations. Steam-Turbine Foundations (Dampfturbinen-Fundamente). Paul Boros. Bauingenieur, vol. 4, no. 11, June 15, 1923, pp. 339-341, 15 figs. Calculation of reinforced-concrete foundations.

Large, Design of. Design Characteristics of Large Steam Turbines. H. F. Ely. Southern Engr., vol. 39, no. 6, Aug. 1923, pp. 43-45, 7 figs. Improvements in design of 25,000- and 30,000-kw. turbines for steam pressures as high as 350 lb. and about 700 deg. steam temperature.

Orifice-Discharge Phenomenon. A Discharge Phenomenon in Steam-Turbine Orifices (Eine Ausstromungserscheinung bei Dampfturbinenmundungen). A. Loschge. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 30, July 28, 1923, pp. 740-741, 11 figs. Describes following phenomenon observed in tests carried out in laboratory of Munich Technical College: the steam jet, after leaving diagonally cut-off nozzle orifices of guide wheel, especially under low pressure conditions, shows inclination to adhere to outside wall of guide-wheel orifice.

Slow Speed of. The Steam Turbine—a Slow-Speed Machine (Die Dampfturbine—ein Langsamläufer). H. Baudisch. Warme, vol. 46, no. 21, May 25, 1923, pp. 219-220. By comparison of specific values of steam turbine with those of other turbo-generators, it is shown that steam turbine is slowest-speed machine; its slow speed is brought about purposely by means of multi-stage construction.

20,000-Kw. 20,000-Kw. Steam Turbine for Shanghai Engineering, vol. 117, no. 3002, July 13, 1923, pp. 39-42, 15 figs. partly on supp. plate. Turbine designed to be operated with steam supplied to stop valve at 180 lb. per sq. in. (gage pressure), and at temperature of 300 deg. cent., while vacuum provided for is 28½ in.

STEEL

Deterioration by Ammonia. Deterioration of Steel and Wrought Iron Tubes in Hot Gaseous Ammonia. J. S. Vanick. Am. Soc. for Steel Treating—Trans., vol. 4, no. 1, July 1923, pp. 62-78, 9 figs. Describes failure in service of wrought iron and steel tubes employed in an apparatus used for decomposition of ammonia; macroscopic and microscopic features of deterioration of metal; briefly sketches relations between temperature and joint reactions representing decomposition of ammonia and nitrogenization of iron to illustrate general character of deterioration of steel in heated ammonia.

Spring, Decarbonization of. The Decarbonization of Spring Steels. Wm. J. Merten. Forging & Heat Treating, vol. 9, no. 7, July 1923, pp. 308-309, 8 figs. Scaling or decarbonization occurring during rolling is claimed to be of minor importance; oxidation takes place while heating unless reducing atmosphere is maintained.

Tempered, Structure of. Structure Phenomena in Tempered Steel (Gefügeerscheinungen im angelassenen Stahl). H. Hanemann. Stahl u. Eisen, vol. 43, no. 27, July 5, 1923, pp. 880-882, 5 figs. Investigation of phenomena of structure in hardened steel at tempering temperatures between 600 and 700 deg. cent.

Testing. Magnetic Testing of Steels (Essai magnétique des aciers à la traction. Limites élastiques). L. Fraichet. Académie des Sciences—Comptes Rendus des Séances, vol. 176, no. 25, June 18, 1923, pp. 1795-1796. Describes method of photographically recording magnetic changes in test bars undergoing elongation tests at constant speed and gives results of experiments.

Tool. See TOOL STEEL.

STEEL CASTINGS

Cleaning. Cleaning Steel Castings. Herbert R. Simonds. Foundry, vol. 51, nos. 9, 11, 12, 13 and 14, May 1, June 1 and 15, July 1 and 15, 1923, pp. 345-350, 457-460, 486-490, 528-532 and 582-587, 35 figs. Importance of cleaning procedure; how apparatus is handled and cared for in torch department; layout for cleaning room; types of grinding wheels; selection and care of wheels; safety considerations; chipping hammers for removing surface defects and chills and

HEAT BALANCE THROUGH DUPLEX DRIVE

DUPLEX driven auxiliaries are becoming more and more important in the power plant because of their adaptability to automatic regulation and control. Apart from their safety feature inherent in the design, which insures that excitation will not be lost even though current to the motor end should be interrupted, they make it possible to maintain practically a constant temperature in the feed water heater. The load on the duplex driven unit can be shifted automatically from motor to turbine so that the turbine will furnish the exact amount of steam required to maintain constant temperature in the feed water. Let us send you the evidence in the form of temperature charts taken from existing plants. It is, of course, essential that the total turbine capacity be sufficient to meet the peak requirements.

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also to knock out hard-burned cores; cost comparisons; care of equipment; cleaning light and medium heavy castings by sand blasting; tumbling adapted to wide use.

Design. The Design of Steel Mold Castings (Konstruktion von Stahlformgussstücken), H. Oeking, Sr. Stahl u. Eisen, vol. 43, no. 26, June 28, 1923, pp. 841–845, 17 figs. Examples for improvements of construction parts from technical viewpoint.

Production. Producing Steel Castings—III, R. A. Bull. Foundry, vol. 51, no. 15, Aug. 1, 1923, pp. 619–623. Occurrence, treatment and mixtures of molding sands; outstanding points of molding and cleaning equipment; review of different American specifications.

STEEL, HEAT TREATMENT OF

Large Sections. Forging and Heat Treating Large Sections, W. R. Klinkicht. Am. Soc. for Steel Treating—Trans., vol. 4, no. 1, July 1923, pp. 50–61, 9 figs. Describes routine operations which are used, as practiced in a modern heavy forging plant equipped with suitable cranes, manipulating devices and heating equipment.

STEEL WORKS

England. The Penistone Works of Cammell Laird and Co., Limited. Engineer, vol. 136, nos. 3523, 3524 and 3525, July 6, 13 and 20, 1923, pp. 2–5 and 14, 30–32 and 42, 62–64 and 72, 26 figs. partly on supp. plates. Details of works in which railway material, rolled sections, billets, etc., are produced from raw material to finished product. July 6: Tire department. July 13: Bessemer plant; soaking pits; section mills, etc. July 20: Electric equipment.

France. A French Steel Plant Built Since the War, Godfrey L. Carden. Iron Age, vol. 112, no. 4, July 26, 1923, pp. 197–201, 8 figs. Schneider works at Caen in Normandy originally a Thyssen enterprise; native ores and British fuel used; basic bessemer and open-hearth steels.

STOKERS

Automatic Combustion Control. Application of Automatic Combustion Control to Mechanical Stokers, Charles H. Smoot. Combustion, vol. 9, no. 2, Aug. 1923, pp. 171–175; also (abstract) Power, vol. 58, no. 4, July 24, 1923, p. 152. Why test runs and commercial operation differ; regulation of mixture important. Paper presented before Am. Stoker Mfrs. Assn.

Chain-Grate. Performance of Large Chain-Grate Stoker at Calumet Station (Chicago). Power, vol. 58, no. 7, Aug. 14, 1923, pp. 254–255, 2 figs. Features of construction and results obtained on stoker 24 ft. wide by 18 ft. 3 in. long.

Multiple-Retort. The Underfeed Type "F" Multiple Retort Stoker. Electrician, vol. 90, no. 2340, Mar. 23, 1923, pp. 307–308, 4 figs. Details of stoker on plan of a number of interchangeable retorts or troughs placed side by side and inclined downward at angle of 20 deg. to horizontal, forming therefore a composite stoker which may be of almost any desired width.

STREET RAILWAYS

Cars. Hull Corporation Tramway Car With Worm Drive. Tramway & Ry. World, vol. 54, no. 3, July 19, 1923, pp. 9–11, 2 figs. Details of lightweight single-truck double-deck car with top cover; quiet running, and reduced power consumption; 60 passengers capacity.

Electrification, Italy. Electrification of Interurban Lines (Sulla elettrificazione delle tramvie extra urbane), Marco Semenza. Elettrotecnica, vol. 10, no. 11, Apr. 15, 1923, pp. 230–234, 2 figs. Present state of steam lines in Po basin; improvement and electrification of lines; systematic interurban lines; etc.

SUPERHEATERS

Boiler Performance, Effect on. Effect of Superheat on Boiler Performance, R. A. Holme. Power, vol. 58, no. 7, Aug. 14, 1923, pp. 259–260, 2 figs. Evaporative performance and boiler efficiency.

T

TANKS

Storage, Large, Fabrication of. Fabricates Large Storage Tanks, John D. Knox. Iron Trade Rev., vol. 73, no. 4, July 26, 1923, pp. 241–247, 12 figs. Units of 80,000-barrel holding capacity are carried in stock by Riter-Conley Co.; construction of large gas holders; description of plant in Pittsburgh district.

TEMPERATURE CONTROL

Automatic. Production Economies through Automatic Temperature Control. Factory, vol. 30, no. 6, and vol. 31, no. 1, June and July, 1923, pp. 696–699, 724, 726, 728, 730, 732 and 734; and 37–40, 68, 70, 72, 74 and 76, 6 figs. June: Regulation of temperature in both drying and workroom. July: Regulation of temperature in industrial heating operations.

TEMPERATURE MEASUREMENT

Instruments. Temperature-Measurement Instruments (Temperaturmessgerate). Archiv fur Warmewirtschaft, vol. 4, no. 7, July 1923, pp. 127–128, 4 figs. Thermoelectrical pyrometers, temperature indicating meters, recording temperature-measuring apparatus, and remote electric resistance thermometers made by Paul de Bruyn Apparatus Co., Dusseldorf.

TERMINALS, RAILWAY

A. R. E. A. Report. Yards and Terminals—Report of Committee XIV. Am. Ry. Eng. Assn.—Bul., vol. 24, no. 255, Mar. 1923, pp. 809–942. Specifications for manufacture and installation of motor truck, built-in, self-contained and portable scales for railway service, pp. 815–835; handling freight in two-track-level freight houses and team tracks, multiple-story freight houses, and by mechanical means, pp. 836–848, 9 figs.; proper relation of passenger station facilities which should exist between business handled and size and arrangement of such facilities, pp. 849–930, 55 figs.

Canadian National Railways. Neebling Terminal, Canadian National Railways. Can. Ry. & Mar. World, no. 305, July 1923, pp. 322–325, 3 figs. Location, layout, and plans of large terminal erected by Canadian National Railways near West Fort William.

Freight. Freight Terminal Executives and Chart of Organization, H. McL. Harding. Eng. World, vol. 23, no. 2, Aug. 1923, pp. 83–87, 2 figs. Details of organization chart of terminal executives for marine or waterway terminals of 10,000 lin. ft., by means of which, supplemented by descriptions outlining authority and responsibility of each position, much friction is eliminated, as relations of individuals to each other are emphatically defined.

Portland, Ore. Passenger Terminal Improvements at Portland, Ore. Eng. News-Rec., vol. 91, no. 3, July 19, 1923, pp. 94–96, 2 figs. To secure joint terminal city vacates streets and railways give land for widening streets; terms of agreement.

TEXTILE MILLS

Power and Process Steam in. Power and Process Steam in Finishing, Alfred Iddles. Textile World, vol. 64, no. 1, July 7, 1923, pp. 83, 85, 87, 89 and 91, 13 figs. Description of installation in a cotton goods, bleaching, dyeing, printing and finishing plant; combinations of non-condensing turbines and bleeder type; relation between electrical load and requirements for process steam studied and unusual degree of heat balance secured.

Producer Gas as Fuel. Producer Gas in the Textile Industry, Paul A. Merriam. Textile World, vol. 63, no. 18, May 5, 1923, pp. 79 and 81–82, 6 figs. A cheap, clean fuel, suitable for mild temperatures employed in various applications of heat; what producer gas is and how it is made; application to yarn and cloth singeing, drying and calender roll heating; description of equipment.

TIRES, RUBBER

Cord. Single Ply Cord Tyre Construction, T. J. Mell. India-Rubber Jl., vol. 65, no. 26, June 30, 1923, pp. 17–18 and 21, 9 figs. Development of motor-car tires and different methods in use; advantages of single-ply method are that it requires less floor space and less supply of stock.

Temperature Measurement on Road. The Measurement of Temperature in Rubber and Insulating Materials by Means of Thermocouples, Ellwood B. Spear and J. F. Purdy. Indus. & Eng. Chem., vol. 15, no. 8, Aug. 1923, pp. 842–845, 7 figs. Describes new thermocouple casing which has been found convenient for measurement of temperatures in solid or pneumatic tires while latter are in use on road.

Vulcanization, Temperature During. The Actual Temperature of Tires During Vulcanization, D. F. Cranor. India Rubber World, vol. 68, no. 5, Aug. 1, 1923, pp. 709–710, 6 figs. Deals with full-molded fabric tires, air-bag single-cured cord tires, and single-cured cord truck tires.

TOOL STEEL

Forging and Heat Treatment. Forging, Annealing, Hardening and Tempering Tool Steel, E. J. O'Leary. West. Machy. World, vol. 14, no. 7, July 1923, pp. 227–228. Important points.

TRADE UNIONS

German, Women in. Women in the German Trade Union Movement, Gertrud Hanna. Int. Labour Rev., vol. 8, no. 1, July 1923, pp. 21–37. Women form more than 20 per cent of membership of "free" trade unions, and similar proportion in other trade-union organizations; women's wages; position of wage-earning women.

TRANSPORTATION

Motor-Truck and Railway. The Coördination of Motor-Truck and Railroad Transportation, W. J. L. Banham. Soc. Automotive Engrs.—Jl., vol. 13, no. 2, Aug. 1923, pp. 122–124 and 138. Terminal transportation; practice in Canada; field of motor truck; trap cars.

TUBES

Seamless Aluminum-Copper-Magnesium Alloy. Tubes, Aluminum-Copper-Magnesium Alloy Seamless. U. S. Army Air Service Specification, No. 11,055-A, June 20, 1923, 4 pp. Specification covering material, manufacture, physical properties and tests, lengths, and packing.

TURBO-GENERATORS

Cooling. Cooling of Turbine Generators, A. R. Smith. Gen. Elec. Rev., vol. 26, no. 8, Aug. 1923, pp. 554–559, 1 fig. Utilization of heat in steam-electric power plants.

Large German. 65,000-Kva. Generator Design, Robert Pohl. Elec. World, vol. 82, no. 5, Aug. 4, 1923, pp. 229–230, 5 figs. Respects in which plan followed in Germany differs from that adopted in America; constant stresses and self-ventilation are main features; coil, teeth and rotor designs are unusual.

Metropolitan-Vickers. Metropolitan-Vickers Turbo Alternators. Elec. Times, vol. 64, no. 1654, June 28, 1923, p. 700, 2 figs. Details of construction.

W

WAGES

Systems. Piece-Time-Rate Determination from Time Records (Stückzeitermittlung aus Zeitaufnahmen), H. von Weese. Werkstattstechnik, vol. 17, no. 12, June 15, 1923, pp. 370–373. Critical discussion of existing methods of piece-rate determination, and suggestion of new method.

Wage Systems (Les nouvelles méthodes de rémunération du travail), Lucien Freling. Technique Moderne, vol. 15, no. 14, July 15, 1923, pp. 427–429, 10 figs. Summary of present systems of time and piece rate and their modifications.

WATER POWER

Development. Graphic Analysis of Economy of Developing Water Powers, G. R. Kenny and Page Golsan. Elec. World, vol. 82, no. 3, July 21, 1923, pp. 119–122, 8 figs. Aid to study of sites which may become economically feasible through increased demand for power, greater interconnection and use of automatic or semi-automatic generating stations.

North Carolina. The Water-Power Situation in North Carolina, Thorndike Saville. N. C. Geological and Economic Survey, Water Resources Division, Circular No. 6, 1923, 25 pp., 3 figs. Status of developed power; growth of power use; growth of steam power; output of public utility power; horsepower required for future power demands; sources of water power; use of power; engineering investigations.

WATER SOFTENING

Plants. New Features Incorporated in Water Softening Plants, C. R. Knowles. Ry. Eng. & Maintenance, vol. 19, no. 7, July 1923, pp. 273–276, 5 figs. Conical bottom tanks and filters new features of water treating plants recently completed by Ill. Central.

WELDING

Repair Jobs. Welding and Brazing Practices That Make Repairs Easy, Gustav Radebaugh. Coal Age, vol. 24, no. 3, July 19, 1923, pp. 99–101, 11 figs. Building fire; repairing a broken machine casting; good job gives part 80 per cent of its original strength; preparing work; various kinds of fluxes; causes of poor weld.

[See also ELECTRIC WELDING; ELECTRIC WELDING, ARC; ELECTRIC WELDING, RESISTANCE; OXY-ACETYLENE WELDING; WELDS.]

WELDS

Quenched-Arc. Quenched Arc Welds, O. H. Eschholz. Am. Weld. Soc.—Jl., vol. 2, no. 6, June 1923, pp. 35–38, 3 figs. Effect of cooling rate on welded structures; control over residual stress, weld strength, ductility, stress distribution, shock and fatigue resistance, points needing further investigation.

WIND MOTORS

Uses. Wind Motors and Their Uses (Les aéromateurs et leurs applications), Ach. Delamarre. Outillage, vol. 7, no. 27, July 7, 1923, pp. 694–699, 3 figs. Power of wind mill, their velocity and operation; formulas and calculations; describes different types of wind mills; generation of electricity by wind power according to various schemes.

WIND TUNNELS

Dimensions and Test Results. The Modification of Wind-Tunnel Results by the Wind-Tunnel Dimensions, Max M. Munk. Franklin Inst.—Jl., vol. 1, no. 2, Aug. 1923, pp. 203–218. Necessary corrections are determined for influence of dimensions of wind tunnel upon results of tests on wings and propellers.

WOOD

Consolidated. Consolidated Wood—A New Material for Various Industries, W. R. Turnbull. Roy. Aeronautical Soc.—Jl., vol. 27, no. 151, July 1923, pp. 342–347, 4 figs. Describes what is called by author consolidated wood, obtained by compressing wood across grain and parallel to annular rings, and its probable advantages for airplane and propeller parts, farm-implement parts, wheel spokes, etc.

WOOD PRESERVATION

A. R. E. A. Report. Wood Preservation—Report of Committee XVII. Am. Ry. Eng. Assn.—Bul., vol. 24, no. 255, Mar. 1923, pp. 943–1041. Service test records, pp. 944–953; Douglas fir treatment, pp. 954–959; treatment of marine piling along Atlantic and Gulf Coasts, pp. 959–964; Pacific Coast marine piling, pp. 965–970, 1 fig.; marine piling investigation, pp. 971–1010, 14 figs.; marine piling research, pp. 1011–1022, 4 figs.; preservative treatment of white oak ties, pp. 1023–1029; mechanical preparation of ties and timber treatment, pp. 1030–1040, 7 figs.; directions for determining penetration of sodium fluoride in wood, p. 1041.

Tie-Treating Plant. Treating Plant at the Dalles Embodies Permanent Construction. Ry. Eng. & Maintenance, vol. 19, no. 8, Aug. 1923, pp. 302–304, 7 figs. Describes timber-treating plant put into operation by Union Pacific at Dalles, Ore.

WORKMEN'S COMPENSATION

Disease as Compensable Injury. Workmen's Compensation. Monthly Labour Rev., vol. 17, no. 1, July 1923, pp. 196–205. Includes article by Lindley D. Clark on Disease as a Compensable Injury.

Pensions, Old-Age. Practice Growing of Paying Old-Age Pensions. Ry. Age, vol. 75, no. 2, July 14, 1923, pp. 65–68. Data on extent to which railways are paying old-age pensions and conditions under which pension systems are conducted.

Alphabetical List of Advertisers

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Foerst, John & Sons	26
*Foote Bros. Gear & Machine Co.	69
France Packing Co.	56
*Franklin Machine Co.	64
*Frick Company	12
*Fuller-Lehigh Co.	27
*Fulton Company	59
Furnace Engineering Co.	27
G *General Electric Co.	8, 100
*Gifford-Wood Co.	85
*Goetze Gasket & Packing Co.	56
*Goodrich, B. F. Rubber Co.	101
*Goulds Mfg. Co.	40
*Graver Corporation	36
*Green Fuel Economizer Co.	26
Gurney Ball Bearing Co.	82
*Gwilliam Company	76
H *H.S.B.W.-Cochrane Corp'n	38
Harrisburg Foundry & Mach. Works	4
Heine Chimney Co.	26
*Hendrick Mfg. Co.	85
Herbert Boiler Co.	20
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Hill Pump & Turbine Works (Division Midwest Engine Corp'n)	10
*Hooven, Owens, Rentschler Co.	4
Hoppes Mfg. Co.	60
*Hyatt Roller Bearing Co.	80
I Improved Equipment Co.	98
*Ingersoll-Rand Co.	13
International Filter Co.	36
J *James, D. O. Mfg. Co.	71
*Jenkins Bros.	45
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Johnson, Carlyle Machine Co.	66
*Jones, W. A. Foundry & Mach. Co.	70
*Jones & Lamson Machine Co.	94, 95
K *Keeler, E. Co.	21
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*Kerr Turbine Co.	9
Keuffel & Esser Co.	—
*Kieley & Mueller (Inc.)	55
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*Landis Machine Co.	91
*Leffel, James & Co.	10
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*Lunkenheimer Co.	42
M McLeod & Henry Co.	35
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Master Electric Co.	12
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*Norma Co. of America	82
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O *O'Brien, John Boiler Works Co.	20
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P *Parker-Kalon Corp'n	90
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*Permutit Co.	59
Philadelphia Drying Machinery Co.	101
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*Pittsburgh Valve, Fdry. & Constr. Co.	51
*Poole Engineering & Machine Co.	7
*Power Specialty Co.	2
*Powers Regulator Co.	—
*Precision Instrument Co.	—
Purvis Machine Co.	92
Q *Quigley Furnace Specialties Co.	31
R Reading Chain & Block Corp'n	87
*Reading Steel Casting Co. (Inc.) (Pratt & Cady Div.)	44
*Ridgway Dynamo & Engine Co.	9
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Rockwood Mfg. Co.	—
*Roebling's, John A. Sons Co.	88
*Royersford Foundry & Machine Co.	79
S *S K F Industries (Inc.)	3
*Sarco Co. (Inc.)	59
*Scaife, Wm. & Sons Co.	99
*Schaeffer & Budenberg Mfg. Co. and American Steam Gauge & Valve Mfg. Co. Division	63
*Schutte & Koerting Co.	93
*Scovill Mfg. Co.	97
*Shepard Elec. Crane & Hoist Co.	—
*Simplex Valve & Meter Co.	60
*Smidth, F. L. & Co.	94
*Smith, H. B. Co.	100
Smith, S. Morgan Co.	10
Smith & Serrell	96
Smooth-On Mfg. Co.	53
*Spray Engineering Co.	58
*Springfield Boiler Co.	—
Steel Mill Packing Co.	98
Sterling Engine Co.	12
Stumpf Una-Flow Engine Co. (Inc.)	4
*Sturtevant, B. F. Co.	57
*Superheater Co.	22
T Taber Pump Co.	41
Taylor Instrument Cos.	64
*Terry Steam Turbine Co.	132
Texas Company	57
*Timken Roller Bearing Co.	77
*Titusville Iron Works Co.	—
Tolhurst Machine Works	91
*Troy Engine & Machine Co.	4
U *Uehling Instrument Co.	61
Union Chain & Mfg. Co.	70
Union Drawn Steel Co.	99
*Union Iron Works	10
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*U. S. Ball Bearing Mfg. Co.	81
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V Vacuum Oil Co.	112
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*Vilter Mfg. Co.	—
*Vogt, Henry Machine Co.	49
W *Walsh & Weidner Boiler Co.	29
*Ward, Charles Engineering Works	—
*Warner & Swasey Co.	90
Wayne Tank & Pump Co. Outside Back Cover	
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Western Engineering & Mfg. Co.	66
*Westinghouse Elec. & Mfg. Co.	27
Weston Electrical Instrument Co.	62
*Wheeler, C. H. Mfg. Co.	40
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Whiting Corporation	85
*Whitney Mfg. Co.	93
*Wickes Boiler Co.	19
*Wood's, T. B. Sons Co.	64
*Worthington Pump & Machinery Corp'n	14
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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1922 Volume*

THE ENGINEERING INDEX

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THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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(See also page 672 of this issue for supplementary items.)

ACCIDENTS

Industrial. Statistics of Industrial Accidents in the United States, Lucian W. Chaney. U. S. Dept. Labor, Bul. Bur. Labor Statistics, no. 339, June 1923, 66 pp. Records of accidents in different states since 1917; records on steam railways, in iron and steel industry, in mines, quarries, and metallurgical works, and in various other industries.

AERODYNAMICS

Plane Tables. The Aerodynamic Plane Table, A. F. Zahm. Nat. Advisory Committee for Aeronautics, Report No. 166, 1923, 10 pp., 11 figs. Describes plane table for accurate and expeditious geometrical measurement of models in an aerodynamic laboratory, and for miscellaneous truing operations.

AERONAUTICAL INSTRUMENTS

Control-Surface-Position Recorder. An Instrument for Recording the Position of Airplane Control Surfaces, K. M. Ronan. Nat. Advisory Committee for Aeronautics—Technical Notes, no. 154, Aug. 1923, 4 pp. 3 figs. on supp. plate. Describes instrument which makes a continuous record of angular position of control surfaces of an airplane in steady flight and during acrobatics; has proven useful in researches into stability and controllability.

Recording Tachometer. The N.A.C.A. Recording Tachometer and Angle of Attack Recorder, H. J. E. Reid. Nat. Advisory Committee for Aeronautics—Technical Notes, no. 156, Aug. 1923, 3 pp., 4 figs. on supp. plate. Description of airplane-flight apparatus for use in conjunction with a recording galvanometer employed for obtaining continuous records of angle of attack and engine speeds.

AERONAUTICS

Research. Making America Independent in the Air. Mech. Eng., vol. 45, no. 9, Sept. 1923, pp. 513–520, 17 figs. Inception of National Advisory Committee for Aeronautics, its organization for research, and results it has achieved at Langley Field laboratory. Wind tunnel testing; instruments for determining magnitude and distribution of stresses in aircraft; flight testing of airplanes; test airplanes; oil-engine design.

Relation between Aeronautic Research and Aircraft Design, Joseph S. Ames. Roy. Aero. Soc.—Jl., vol. 27, no. 152, Aug. 1923, pp. 381–404, 23 figs. Wilbur Wright lecture, delivered May 31, 1923.

Standardisation of Methods of Research, Richard Glazebrook. Flight, vol. 15, no. 26, June 28, 1923, pp. 347–350, 2 figs. Progress of research in various countries, especially on models carried out in wind tunnels of different designs.

AIR COMPRESSORS

Losses. Wastage in Compressed-air Systems, F. Johnstone Taylor. Eng. & Min. Jl.-Press, vol. 116, no. 8, Aug. 25, 1923, pp. 331–332, 6 figs. Meter an effective aid in checking power losses; describes different types.

AIR PUMPS

Steam-Condensing Plants. Development of Air Pumps for Steam Condensing Plants, W. A. Dexter. Inst. Mar. Engrs.—Trans., vol. 35, July 1923, pp. 77–120 and (discussion) 120–130, 27 figs. Description of different types of pumps and their uses.

AIRCRAFT

Carriers. U. S. S. Langley, our First Aircraft Carrier, H. R. Keller. Am. Soc. Naval Engrs.—Jl., vol. 35, no. 3, Aug. 1923, pp. 500–525, 11 figs. Description of aircraft carrier built from former collier Jupiter.

AIRPLANE ENGINES

Heavy-Oil. The Heavy-Oil Aero Engine, J. L. Chaloner. Gas & Oil Power, vol. 18, no. 215, Aug. 2, 1923, pp. 181–183, 2 figs. Discusses progress and prospects of heavy-oil airplane engine.

Revolver-Type. The Revolver Type Engine. Autocar, vol. 51, no. 1450, Aug. 3, 1923, p. 189, 2 figs. A design which was tried in France ten years ago, and which has now been produced by Edouard Ladge in form of a 300-hp. aero engine with 16 cylinders arranged in two horizontally opposed rings or magazines of eight each; principles upon which it works, embodying novelty and simplicity; increased thermal efficiency.

AIRPLANES

Airfoils. The Effect of Airfoil Thickness and Plan Form on Lateral Control, H. I. Hoot. Nat. Advisory Committee for Aeronautics, Report No. 169, 1923, 11 pp., 23 figs. Description of tests carried out on six model airfoils in wind tunnel to determine effectiveness of ailerons, and results obtained.

Bleriot. An Unorthodox French Commercial Aeroplane. Flight, vol. 15, no. 28, July 12, 1923, pp. 382–384, 4 figs. Bleriot 115, with four Hispano engines, placed on wings.

Boll-Weevil-Fighting. Fighting Boll Weevil by Means of Airplanes. Aviation, vol. 15, no. 8, Aug. 20, 1923, pp. 210–212, 2 figs. "Dusting Planes" said to be efficient and economical; distribution of poison powder; dusting above fog.

Bristol School. The "Bristol" Lucifer School Machine. Flight, vol. 15, no. 30, July 26, 1923, p. 435, 2 figs. Describes strong machine excellently suitable for instructional purposes.

Commercial. Lincoln-Standard LS5 Commercial Airplane. Aviation, vol. 15, no. 9, Aug. 27, 1923, pp. 242–243, 2 figs. Details of design of five-place semi-enclosed passenger-carrying machine. Safety, economy, upkeep, etc.

Cox-Klemin Training. Cox Klemin Model CK2 Training Plane. Aviation, vol. 15, no. 12, Sept. 17, 1923, p. 339, 1 fig. New side-by-side training plane fitted with Wright E engine developed for Army air service.

De Havilland. A New De Havilland Commercial Aeroplane. Flight, vol. 15, no. 32, Aug. 9, 1923, pp. 473–477, 7 figs. Details of D. H. 50 with 240-hp. Siddeley "Puma" engine.

Gliders. Description of the Hannover Glider "Vampyre," Walter Blume. Aviation, vol. 15, no. 9, Aug. 27, 1923, pp. 238–241, 3 figs. Main features of design; fuselage construction; record of test flights.

Gothenburg Exhibition. The Exhibits at Gothenburg, L. Bridgman. Aeroplane, vol. 25, no. 7, Aug. 15, 1923, pp. 183–184, 186, and 188, 8 figs. Description of several exhibits.

Mail. The Aeromarine Night Mail Plane. Aviation, vol. 15, no. 10, Sept. 3, 1923, pp. 274–275, 2 figs. All-metal fuselage, high-lift wings, and Liberty engine are distinguishing features of new airplane.

The Curtiss Night Mail Plane. Aviation, vol. 15, no. 10, Sept. 3, 1923, pp. 272–273, 2 figs. Powered with C6 163-hp. engine; performance and weights; characteristics and special features.

The Glenn L. Martin Night Mail Plane. Aviation, vol. 15, no. 10, Sept. 3, 1923, pp. 270–271, 2 figs. Powered with Wright E4 200-hp. engine; performance data; details of wings and tail surfaces; landing gear and controls.

Racers. "Grand Prix de la Moto-Aviette" Reviewed. Aviation, vol. 15, no. 8, Aug. 20, 1923, pp. 213–215, 1 fig. French light-plane race, won by Farman, showed surprising progress in low-powdered flight; Farman, Dewoitine, Breguet, Hanriot, and Peyret planes.

Seaplanes. See SEAPLANES.

Wings. Thrust Centers and Maximum Load of Wings (Les centres de poussé et les portances maxima des ailes), W. Margoulis. Aéronautique, vol. 5, nos. 49 and 50, June and July 1923, pp. 254–259 and 292–300, 15 figs. Effect of profile of carrying surfaces on longitudinal stability; recent Göttingen experiments on wing profiles; Joukowski profile; transformation of Joukowski formula; wing profiles proposed by Mises and Tchapliguine; thrust centers; effect of number and disposition of wings.

AIRSHIPS

Rigid. New Type of Rigid Airship, H. K. Ihrig. Aviation, vol. 15, no. 10, Sept. 3, 1923, p. 283, 1 fig. Proposed type with external helium chambers and internal hydrogen chambers.

U. S. A. RN1. Description of U. S. Army Airship RN1. Aviation, vol. 15, no. 10, Sept. 3, 1923, pp. 276–277, 2 figs. Largest non-rigid airship in America is 262 ft. long with maximum beam of 48 ft., overall height, 70 ft.; gas capacity, 340,000 cu. ft.

U. S. N. ZR-1. Navy's New Dirigible, ZR-1, Completes Trial Flight Successfully, Herbert Chase. Automotive Industries, vol. 49, no. 10, Sept. 6, 1923, pp. 474–478, 8 figs. Largest American-built airship resembles German Zeppelins; measures 680 ft. in length and 78 ft. in diam. and carries crew of 31 men; cruising radius, 4000 mi.; powered with six 300-hp. special Packard engines.

ALCOHOL

Denatured. Denatured Alcohol in Canada, Ross E. Gilmore. Can. Chem. & Metallurgy, vol. 7, nos. 5 and 6, May and June, 1923, pp. 116–118 and 155–158. Also Chem. & Industry, vol. 42, no. 34, Aug. 24, 1923, pp. 802–808. Complete summary of composition, use and consumption of denatured alcohol with review of regulations in United States and Great Britain; recoverability and toxicity; denatured alcohol in Great Britain and United States; industrial alcohol for motor fuel; quality and price.

ALIGNMENT CHARTS

Practical Construction. Practical Construction of Alinement Charts, R. T. Livingston. Power Plant Eng., vol. 27, no. 18, Sept. 15, 1923, pp. 933–935, 5 figs. Study of various types of charts for various purposes.

ALLOYS

Brass. See BRASS.

Bronze. See BRONZE.

Research. Research and Control Methods in Metallurgy (Méthodes de recherche et de contrôle dans la métallurgie de précision), Pierre Chevenard. Société des Ingénieurs Civils de France—Proces-Verbal, no. 13, June 22, 1923, pp. 451–457. Deals with a series of alloys of special physical and chemical properties produced at Imphy works of Commentry-Fourchambault Co., including invar, elinvar, platinite—which can be welded to glass, etc., and describes methods of testing.

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NOTE.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 138

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Mchry Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
* Clarage Fan Co.
Helmer Air Conditioning Corp'n
Midwest Steel & Supply Co. (Inc.)
* Sturtevant, B. F. Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
* Clarage Fan Co.
* Cooling Tower Co. (Inc.)
Helmer Air Conditioning Corp'n
* Spray Engineering Co.
* Sturtevant, B. F. Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Anchorages, Overhead Transmission
Midwest Steel & Supply Co. (Inc.)

Anemometers
* Taylor Instrument Cos.
Weber, F. Co. (Inc.)

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
* Liptak Fire-Brick Arch Co.
* McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
* McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
* Combustion Engineering Corp'n
* Liptak Fire-Brick Arch Co.
* McLeod & Henry Co.

Asbestos Products
Johns-Manville (Inc.)

Axles, Car
* Fuller-Lehigh Co.

Babbitt Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* New Departure Mfg. Co.
* S K F Industries (Inc.)

Barometers
* American Schaeffer & Budenberg Corp'n
* Taylor Instrument Cos.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* New Departure Mfg. Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Radial Thrust
* New Departure Mfg. Co.

Bearing, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdry. & Mach. Co.
* Timken Roller Bearing Co.

Bearings, Self-Oiling
* Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
* Dixon, Joseph Crucible Co.
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
* Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B. Sons Co.

Belting, Canvas (Stitched)
* United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Belting, Leather
American Sole & Belting Leather Tanners (Inc.)

Belting, Rubber
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Benches, Work
Manufacturing Equip. & Engrg. Co.

Bending & Straightening Machines
* Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Mchry. Co.

Blocks, Tackle
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
* Clarage Fan Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
* Clarage Fan Co.
* Green Fuel Economizer Co.
* Sturtevant, B. F. Co.

Blowers, Forge
* Sturtevant, B. F. Co.

Blowers, Pressure
* American Blower Co.
* Clarage Fan Co.
Lammert & Mann Co.
* Sturtevant, B. F. Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.
* Sturtevant, B. F. Co.

Blowers, Soot
Bayer Co.
Diamond Power Specialty Corp'n
* Sturtevant, B. F. Co.

Blowers, Steam Jet
* Schutte & Koerting Co.

Blowers, Turbine
* Sturtevant, B. F. Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Boiler Baffles
* King Refractories Co. (Inc.)
* McLeod & Henry Co.

Boiler Compounds
* Dixon, Joseph Crucible Co.
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
* McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Connelly, D. Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Connelly, D. Boiler Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Webster, Howard J.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Connelly, D. Boiler Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
Morrison Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
Morrison Boiler Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
Morrison Boiler Co.
* O'Brien, John Boiler Works Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Box Rails
Midwest Steel & Supply Co. (Inc.)

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
Johns-Manville (Inc.)

Brakes, Air
* Allis Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
Morrison Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
* King Refractories Co. (Inc.)
* McLeod & Henry Co.

Brick Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.
Link-Belt Co.

Bridgewalls (Furnace)
* McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Morse Dry Dock & Repair Co. (Fuel Oil Engrg. Dept.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

AMMONIA COMPRESSORS

Single-Acting. Performance of Single Acting Simple Ammonia Compressor, and Tubular Condensers. Refrig. Eng., vol. 10, no. 1, July 1923, pp. 14-21. Discussion of paper by George A. Horne, printed in same journal, Nov. 1922. (See reference in Eng. Index 1922, p. 35.)

ANEMOMETERS

Recording. A Component Anemometer, Kyotoku Fun. Japanese Jl. Physics—Trans., Abstracts, vol. 1, no. 9-10, 1923, pp. 101-106, 5 figs. partly on supp. plates. Construction and operation of an anemometer recording continuously two rectangular components of wind velocity.

APPRENTICES, TRAINING OF

Foundry. Training Foundry Apprentices, H. A. Frommelt. Foundry, vol. 51, nos. 17 and 18, Sept. 1 and 15, 1923, pp. 689-691 and 737-739, 2 figs. Educational system with both practical and theoretical branches established by Falk Corporation, Milwaukee, Wis.

Training Foundry Apprentices in France, H. M. Lane. Iron Age, vol. 112, no. 12, Sept. 20, 1923, pp. 734-734, 1 fig. Making directors of molding-machine operators and foremen, much of work done in green sand rather dry.

Metropolitan-Vickers Plan. Engineering Training. Practical Engr., vol. 68, no. 1902, Aug. 9, 1923, pp. 78-9. Trade, college and school apprenticeship; training of assistant foremen. Extracted from pamphlet issued by Metropolitan-Vickers Elec. Co., giving full particulars of courses of training in its works.

AUTOMOBILE ENGINES

Carburetors. See CARBURETORS.

Lubrication. Dilution of Crankcase Oil is Serious Factor Even in Summer, A. Ludlow Clayden. Automotive Industries, vol. 49, no. 9, Aug. 30, 1923, pp. 415-417, 3 figs. Average of 10 to 15 per cent of fuel in lubricant in hot weather greatly reduces viscosity. Oxidation which strikes under side of hot piston head encouraged by mixing. Keeping oil cool and free from dirt.

Testing. How One British Laboratory Conducts Tests of Automotive Engines, Harry R. Ricardo. Automotive Industries, vol. 49, no. 11, Sept. 13, 1923, pp. 527-531, 5 figs. Experimental work shows that unsatisfactory performance is due chiefly to poorly designed combustion chambers which give rise to detonation, incomplete burning of fuel and to excessive mechanical losses; faulty distribution required overrich mixtures.

On the Testing of Engines, H. R. Ricardo. Automobile Engr., vol. 13, no. 179, Aug. 1923, pp. 250-255, 14 figs. Apparatus required and methods of testing.

AUTOMOBILE FUELS

Alcohol. Alcohol the Motor Fuel of the Future, C. C. Green. Chem. Age (Lond.), vol. 9, no. 215, July 28, 1923, pp. 84-85. Description of sources and manufacture of alcohol; tabulated comparison of characteristics of alcohol, gasoline and benzol, with deductions drawn therefrom; results from practical experience in use of an alcohol mixture in modern motor car.

See also ALCOHOL.

Lignite and Peat Products. Substitute Automotive Fuels Obtained from Lignite and Peat, P. M. Heldt. Automotive Industries, vol. 49, no. 11, Sept. 13, 1923, pp. 536-537. Low-temperature-distillation system applicable to these as well as coal; both used extensively in Europe; lubricating oils are obtained, but quality has been unsatisfactory; experiments made in Germany and other countries.

AUTOMOBILE MANUFACTURING PLANTS

Citroën, Paris, France. Features of a French Automobile Plant. Iron Age, vol. 112, no. 11, Sept. 13, 1923, pp. 672-673, 3 figs. Citroen plant in Paris installs tube and billet mills; rapid handling of cars by paint-drying system.

Conveying Bodies to Assembly. Conveying Automobile Bodies to Assembly. Iron Age, vol. 112, no. 7, Aug. 16, 1923, pp. 406-407, 3 figs. Efficient handling through tunnel under Cleveland street; both vertical and horizontal movement.

Ford River Rouge Plant. Ford Principles and Practice at River Rouge. John H. Van Deventer. Indus. Management (N. Y.), vol. 66, no. 3, Sept. 1923, pp. 151-159, 26 figs. Manufacturing and assembling body parts.

Quality Engineering Department. Standards of Quality Are Maintained by Special Department, W. L. Carver. Automotive Industries, vol. 49, no. 8, Aug. 23, 1923, pp. 376-378. Details of quality engineering department inaugurated at plant of Packard Motor Car Co. for maintenance of uniform standard quality throughout entire production and constant study and investigation from every angle toward any improvement consistent with standards of engineering, manufacturing and service departments; how it operates and what it accomplishes.

Rolls-Royce. Quality Production. Eng. Production, vol. 6, nos. 131 and 132, Aug. and Sept. 1923, pp. 361-369 and 383-388, 34 figs. Manufacturing processes on new 20-hp. Rolls-Royce chassis.

AUTOMOBILES

Armstrong-Siddeley. New Four-Cylinder Armstrong Siddeley Added to Six-Cylinder Line, M. W. Bourdon. Automotive Industries, vol. 49, no. 8, Aug. 23, 1923, pp. 362-363, 2 figs. Designed to meet American competition in England; selling price £400; has piston displacement of 112 cu. in. and wheelbase of 111 in.; vaned flywheel spokes cause draft and eliminate need for fan; overhead valves and single plate clutch.

Body Finishing. Body Finishing Costs Are Reduced by Progressive System. Automotive Industries, vol. 49, no. 7, Aug. 16, 1923, pp. 328-330, 4 figs. Comparison of Overland and Willys-Knight operations indicate relative expense of enameling and painting; former required 5 hours and latter 7 days; conveyor carries bodies without interruption from unfinished state to chassis assembly line.

Brakes. Four-Wheel Brake Developments.—Autocar, vol. 51, no. 1452, Aug. 17, 1923, pp. 296-298, 5 figs. Magnetically operated brakes for front or rear wheels; improved methods of four-wheel brake application.

Proper Study of Weight Distribution Essential to Correct Brake Design, P. M. Heldt. Automotive Industries, vol. 49, nos. 6, 7, 8 and 9, Aug. 9, 16, 23 and 30, 1923, pp. 258-260, 322-324, 370-373 and 424-426, 2 figs. Discussion of important phases of brake design. Aug. 9: Inaccuracies in calculating efficiency of various brake elements. Aug. 16: Advantages and disadvantages of transmission brakes. Aug. 23: Major problems involved in four-wheel brake design. Aug. 30: Pressure is more evenly distributed over surface of hand brakes.

Quality of Brakes Has Marked Effect on Capacity of Highways, W. S. James. Automotive Industries, vol. 49, no. 9, Aug. 30, 1923, pp. 412-414, 4 figs. Minimum stopping distance is usually controlled by friction between tires and road and proportion of weight on wheels which are braked. Slippery road surfaces and unsafe brakes reduce number of vehicles per hour arteries can handle.

Cadillac. New Principle of Balancing 8-Cylinder V-Engine Feature of 1924 Cadillac. J. Edward Schipper. Automotive Industries, vol. 49, no. 11, Sept. 13, 1923, pp. 516-519, 10 figs. Crankshaft has four crank throws in two planes at right angles to each other; designed to permit reciprocating inertia forces to cancel out; four-wheel brakes are standard equipment.

Citroën. The New Citroën 7.5 Hp. Car. Auto-Motor Jl., vol. 28, no. 31, Aug. 2, 1923, pp. 641-644, 9 figs. Details of new small-car engine, clutch and gear of which comprise a one-unit power plant, with four cylinders cast en bloc and a three-point suspension in chassis frame, capable of making 40 m.p.h. under normal conditions, and will climb 5.5 per cent grades on top gear.

Gwynne 8. The "Gwynne 8" Chassis. Automobile Engr., vol. 13, no. 179, Aug. 1923, pp. 226-231, 13 figs. Design and performance.

Lagonda. The 12 Hp. Lagonda. Auto-Motor Jl., vol. 28, no. 32, Aug. 9, 1923, pp. 661-664, 10 figs. Novel method of light frame and body construction; engine has overhead inlet valves.

Oakland. 1924 Oakland Model Differs Radically from Previous Design, W. L. Carver. Automotive Industries, vol. 49, no. 10, Sept. 6, 1923, pp. 462-468, 11 figs. L-head engine replaces overhead-valve type previously used; 4-wheel brakes and combustion chamber of Ricardo type are new features.

Parts Manufacture. Addition of Simple Fixtures Lowers Manufacturing Costs. Automotive Industries, vol. 49, no. 8, Aug. 23, 1923, pp. 380-382, 8 figs. Economic problems of parts manufacturing plant; considerable flexibility in equipment often necessary; efficiency can be increased without raising overhead expense; special grinding process simplifies work on horns; describes methods found useful.

Repair Service. Automotive Service Methods and Equipment, Howard Campbell. Am. Mach., vol. 59, no. 12, Sept. 20, 1923, pp. 429-432, 12 figs. Regrinding pistons; broaching wristpin bushings; boring main bearings.

Automotive Service Methods and Equipment, Howard Campbell. Am. Mach., vol. 59, no. 10, Sept. 6, 1923, pp. 355-358, 10 figs. Service operations in a Dorris station; saving time with testing, reaming and riveting fixtures; locating knocks; greasing with a force pump.

Salmson. The Salmson Light Car. Auto-Motor Jl., vol. 28, no. 33, Aug. 16, 1923, pp. 683-686, 10 figs. Details of design of new models of Salmson, a small French car.

Signal and Tail Lights. Electric Signal and Tail Lights for Cars. Elec. Ry. Jl., vol. 62, no. 9, Sept. 1, 1923, pp. 333-334, 4 figs. Use of an inside shell, fitted with glass of different colors, which can be rotated between lamps and lens, permits a variety of indications to be given.

Suspension. Suspension of Vehicles (Quelques remarques sur la suspension des vehicules), P. Lemaire. Technique Moderne, vol. 15, nos. 8, 9, 10 and 11, Apr. 15, May 1, 15 and June 1, 1923, pp. 241-243, 265-273, 300-307 and 327-331, 24 figs. Dynamic and geometric laws of motion; formulas and calculations; characteristics of springs; movement of axles and parts suspended; movement of chassis during running; definition of comfortable riding; amplitude of oscillations and their absorption; experimental verification; measuring coefficient of "comfortable;" etc.

Talbot-Darracq. New Talbot-Darracqs Generate 70 Hp. at 5000 R.P.M., W. F. Bradley. Automotive Industries, vol. 49, no. 9, Aug. 30, 1923, pp. 428-429, 3 figs. Piston displacement of 91.5 cu. in.; four-cylinder engine with two camshafts; power-plant measures only 22 in. overall; roller bearings except on piston pins.

Talbot Racers. New 1,500 cc. Talbot Racers. Autocar, vol. 51, no. 1452, Aug. 17, 1923, pp. 292-293, 6 figs. Details of design of French-built cars; four-cylinder two-valve engines and solid axles adopted.

Transmissions. Transmissions and Their Application to Automobiles and Machine Tools (I cambi di velocita ad ingranaggi e loro applicazioni nell'automobilismo e nelle macchine utensili), F. Stassi-d'Alia. Industria, vol. 37, nos. 8 and 9, Apr. 30 and May 15 1923, pp. 141-145 and 162-164, 30 figs. Description of various types, their characteristics and operation, gearing, etc., including Bramley Moore, Daimler Wolseley, Bradford, Kimberley, and others.

Wheels. Comparative Merits of Steel Disc and Wood Wheels for Automobiles, J. W. White. Soc. Automotive Engrs.—Jl., vol. 13, no. 8, Sept. 1923, pp. 207-211 and (discussion) 211-212, 3 figs. Problem of whether, in connection with disc wheel, a five or four-wheel set will be preferred generally; disk-wheel-tire inflation; disk and wood-wheel comparisons; essential technical features of disk wheel that require careful study; resiliency and fatigue; energy for acceleration; noise; steel for disk wheels; finish.

Wire Wheels, W. W. Davison. Soc. Automotive Engrs.—Jl., vol. 13, no. 3, Sept. 1923, pp. 201-204 and 233, 5 figs. Discusses spoke breakage, chief difficulty in use of wire wheels for heavy cars during pioneer days; spoke design; triple-spoke system; greater tire mileage, easy tire changes, and quicker get-away obtained with wire-wheel-equipped car; driving parts.

AVIATION

Aerial Transportation. Air Transport, W. Sefton Brancker. Inst. of Transport—Jl., vol. 4, no. 9, July 1923, pp. 357-366 and (discussion) 367-384. Value of air transport; its relation to other forms of transportation; economic, safety, and other factors.

Lighting for Night Flying. Artificial Illumination for Landing Fields, Charles Stahl. Aviation, vol. 15, no. 11, Sept. 10, 1923, pp. 302-304, 7 figs. Notes on lighting requirements for night landing; airplane searchlights; long-range beacon light; illuminating the fields.

B

BAGASSE

Fuel Value. Increasing Fuel Value of Bagasse, H. Sornay. La. Planter & Sugar Mfr., vol. 71, no. 6, Aug. 11, 1923, pp. 113 and 124. How to avoid use of another fuel than bagasse; improving quality of bagasse; bagasse drying; etc.

BALANCING

Rotating Machinery. Mechanical Balance of Rotating Machinery, Philip G. Bernholz. Power Plant Eng., vol. 27, no. 17, Sept. 1, 1923, pp. 891-892, 1 fig. Deals with medium-size and medium-speed machines; taking running balance.

BEARINGS

Anti-Friction. Tracing Anti-Friction Bearings to their Origin, Philip C. Gunion. Belting, vol. 23, nos. 1 and 2, July and Aug. 1923, pp. 36, 38, 40, 42, and 30 and 32, 4 figs. July: Principles of modern bearings used by ancients; wheels and pulleys; babbitt metal, function of lubricant. Aug.: Development of ball and roller bearings.

BEARINGS, BALL

Quality Research. Research Finds Answers to Questions About Ball Bearing Quality, H. G. Freeland. Automotive Industries, vol. 49, no. 8, Aug. 23, 1923, pp. 368-369. Metallurgist claims inner race is part most susceptible to failure; impossible to procure steel which is entirely free from defects; approves cold forming and forging process; says strains set up during manufacture are relieved by annealing.

BEARINGS, THRUST

Michell. Michell Bearings for Tunnel Shafting. Engineering, vol. 116, no. 3005, Aug. 3, 1923, p. 157, 11 figs. Notes on application of Michell principle to lubrication of tunnel shafting of S. S. Philoctetes.

BELT DRIVE

Fundamentals. Fundamentals of Transmission of Power by Belting, Louis W. Arny. Indus. Management (Lond.), vol. 10, no. 3, Aug. 9, 1923, pp. 73-84, 2 figs. Pulley grip and elasticity essential to efficiency in a belt; large influence of arc of contact.

Lumber Mill. Typical Belt Drives in Lumber Mill of Latest Design, W. A. Scott. Belting, vol. 23, no. 2, Aug. 1923, pp. 21-23, 8 figs. Practice of Sugar Pine Lumber Co., Pinedale, Cal.; large number of big and heavy leather belts used, while rubber conveyor belts are also in service.

BELTING

Leather, Tests of. How a Leather Belt Transmits Power, J. Edgar Rhoads and R. R. Tatnall. Iron Age, vol. 112, no. 8, Aug. 23, 1923, pp. 484-485, 4 figs. Considerations of tension on two sides of belt; relation of speed and friction to power.

BLAST-FURNACE GAS

Burners. Blast-Furnace Gas Burners. Practical Engr., vol. 68, no. 1901, Aug. 2, 1923, pp. 61-62, 5 figs. Describes burners made by Power Gas Economy Co., Glasgow.

Utilization. Utilization of Blast-Furnace and Coke-Oven Gas (Sur l'utilisation des gaz de hauts fourneaux et de fours à coke), Lucien Mauge. Métallurgie, vol. 55, nos. 23 and 24, June 7 and 14, 1923, pp. 823-825 and 359-360. Characteristics of these gases; use for boiler firing; firing of Martin furnaces; use of mixture of both gases; coke-oven gas for synthetic ammonia by Claude process.

BLAST FURNACES

Charging. Variation of Ratio of Coke and Determination of Price of Raw Materials in the Thomas Pig

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* American Schaeffer & Budenberg Corp'n
* Sarco Co. (Inc.)

Cars, Charging
* Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
* Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co.

Castings, Brass
* Croll-Reynolds Engineering Co.
Du Pont Engineering Co.
* Edward Valve & Mfg. Co.

Castings, Die-Molded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Heavy
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Iron
* Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
Chain Belt Co.
* Cole, R. D. Mfg. Co.
* Croll-Reynolds Engineering Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
* Harrisburg Fdry. & Mach. Wks.
Hooven, Owens, Rentschler Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Royersford Fdry. & Mach. Co.
Treadwell Engineering Co.
* U. S. Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)
* Edward Valve & Mfg. Co.

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
Chain Belt Co.
* Croll-Reynolds Engrg. Co. (Inc.)
Hooven, Owens, Rentschler Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Vogt, Henry Machine Co.

Castings, Steel
* Falk Corporation
Link-Belt Co.
Mackintosh-Hemphill Co.
* Reading Steel Casting Co. (Inc.)
(Reading Valve & Fittings Div.)
Treadwell Engineering Co.

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Iron and Steel
Smooth-On Mfg. Co.

Cement, Pipe Joint
Smooth-On Mfg. Co.

Cement, Refractory
* Celite Products Co.
Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement, Water-Resistant
Smooth-On Mfg. Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchry. Corp'n

Chain Belts and Links
Chain Belt Co.
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co.
Chain Belt Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Pressed Steel
* Parker-Kalon Corp'n

Charging Machines
* Whiting Corp'n

Chimneys, Brick (Radial)
American Chimney Corp'n
Heine Chimney Co.
Morrison Boiler Co.

Chimneys, Concrete
American Chimney Corp'n
Heine Chimney Co.

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Cloth, Rubber
* Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Clutches, Friction
* Allis-Chalmers Mfg. Co.
* Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works
* Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.
* Shepard Elect. Crane & Hoist Co.

Coal Bins
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Cocks, Air and Gage
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* American Schaeffer & Budenberg Corp'n
* Crane Co.
* Crosby Steam Gage & Valve Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Chain Belt Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Coloring (Metal)
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Sarco Co. (Inc.)
* Uehling Instrument Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.
* Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
Hooven, Owens, Rentschler Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* U. S. Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Conduits
Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.
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* Builders Iron Foundry
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* Davis, G. M. Regulator Co.
* General Electric Co.
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* Whiting Corporation

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* Allis Chalmers Mfg. Co.
* General Electric Co.
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* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

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* Allington & Curtis Mfg. Co.
* Sturtevant, B. F. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Conveyors, Ice
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

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* Central Foundry Co.
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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

Iron Blast Furnaces (Variation de la mise au mille de coke et détermination du prix des matières premières dans les hauts fourneaux en fonte Thomas), P. Presles. Revue de Métallurgie, vol. 20, no. 7, July 1923, pp. 457–468. Calculations of quantity of coke for ores of different character and for different composition of coke; cost per ton of smelting under varying conditions.

Operation. The Use of Hot, Dry, Humid or Superoxidized Air in Gas Producers, Cupolas and Blast Furnaces (Remarques diverses au sujet de l'emploi de l'air chaud, de l'air sec ou humide et de l'air suroxygéné dans les gazogènes, cubilots et hauts fourneaux), J. Seigle. Revue de Métallurgie, vol. 20, no. 7, July 1923, pp. 481–489, 1 fig. Varying conditions desired in each case; gas producers and furnaces.

BOILER FEEDWATER

Degassing. The Kestner System of Purification, Evaporation and De-Gassing. Power Engr., vol. 18, nos. 208 and 209, July and Aug. 1923, pp. 262–264 and 309–311, 9 figs. In Paul Kestner's system of boiler feedwater purification a small percentage of boiler contents is continuously blown down, being carried to softening apparatus, thus heating up raw water and shortening time required for elimination of salts. Kestner evaporator.

Salt Elimination. Concentration Salinity Indicators for Measurement of Surface-Condenser Leakage and Distilling Plant Operation, C. A. Jones. Am. Soc. Naval Engrs.—Jl., vol. 35, no. 3, Aug. 1923, pp. 526–538, 12 figs. Apparatus and methods developed to eliminate salt from boiler feedwater.

BOILER FIRING

Tempering Coal. The Tempering of Coal, Thomas A. Marsh. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 369–379, 4 figs. Conclusions drawn from investigations, reports to questionnaires, and discussion.

BOILER FURNACES

Air Preheating. Air Preheater Types and Application, Johnstone Taylor. Power Plant Eng., vol. 27, no. 18, Sept. 15, 1923, pp. 928–930, 5 figs. Review of British attitude towards benefits derived from use of preheated air for boiler furnaces.

Howden-Ljungstrom Air Preheater. Elec. Times, vol. 64, no. 1660, Aug. 9, 1923, p. 141, 2 figs. Tests show high saving, with both coal and oil as fuels.

Ljungstrom Air Preheater. Chem. & Met. Eng., vol. 29, no. 8, Aug. 20, 1923, pp. 326–327, 3 figs. Carries heat continually in mechanical way from flue gases to incoming air; compact in design, simple in operation and permits ready application to existing plants or new installations.

The Howden-Ljungstrom Air Preheater. Elec. Rev., vol. 93, no. 2385, Aug. 10, 1923, p. 210, 1 fig. Brief description of new device applicable to many types of furnaces. Saving in fuel.

Arches. General Factors Governing Design of Arches, Zuce Kogan. Power Plant Eng., vol. 27, no. 18, Sept. 15, 1923, pp. 930–942, 2 figs. Analysis of action of arches and factors involved in their design.

Forced Draft. Should Draft Over the Fire Be Controlled? E. M. Eliot. Steam Power, vol. 2, no. 5, June 1923, p. 10, 1 fig. Outline of conditions which must be met in determining most economical draft over fire for any boiler using forced draft.

Gas Explosions in. Gas Explosions in Boiler Furnaces and Flues (Les explosions de gaz dans les foyers et carneaux de chaudières), Victor Kammerer. Societe Industrielle de Mulhouse—Bul., vol. 89, no. 5, May 1923, pp. 317–325. Presence of explosive mixtures in boiler furnaces, and rules to follow for avoiding explosions and consequent damage.

BOILER OPERATION

Combustion-Control Apparatus. Present State of Combustion Control (La tecnica del controllo della combustione allo stato presente). Industria, vol. 37, nos. 5, 6 and 8, Mar. 15, 31 and Apr. 30, 1923, pp. 94–96, 113–114 and 149–150, 19 figs. Deals with manometers; water, steam, and gas meters; thermometers, pyrometers; pyroscopes; apparatus for analysis of products of combustion; etc.

Graphic Control. Graphic Control Applied to Steam Generators (Le contrôle graphique individuel appliqué aux générateurs de vapeur), H. Carra and F. Reymond. Chaleur & Industrie, vol. 4, no. 38, June 1923, pp. 511–513, 4 figs. on supp. plate. Charts showing avoidable losses in steam generators, and their application.

Oil Firing, Automatic Control for. Automatic Control for Oil Fired Boilers, S. B. Derby. Power Plant Eng., vol. 27, no. 17, Sept. 1, 1923, pp. 875–876, 2 figs. Scheme used in plant of John B. Stetson Co. which has given satisfactory results.

Temperature Control. Temperature Control for Boilers, F. D. Potter. Combustion, vol. 8, no. 5, June 1923, pp. 374–376, 3 figs. Presents chart and table showing relation between temperature and CO_2.

Troubles. Boiler Troubles from the Operating Man's Standpoint, Carl J. Smith. Assn. Iron & Steel Elec. Engrs. vol. 5, no. 9, Sept. 1923, pp. 349–353. Deals with troubles encountered in operation and maintenance of steel-mill boilers.

Water-Tube Boilers. Recent Water Tube Boiler Practice, A. G. Pratt. Steam Power, vol. 2, no. 7, Aug. 1923, pp. 5, 10, and 12. Improvements in design enabling more efficient operation; use of pulverized coal for boiler firing.

BOILER PLANTS

Heat and Power Losses. Power Problems of Vital Interest to Executives, James T. Beard. Indus. Management (N. Y.), vol. 66, no. 3, Sept. 1923, pp. 170–176, 7 figs. Heat and power losses, and how to prevent them.

National Biscuit Co., Buffalo, N. Y. Uneeda Bakers Start Up New Buffalo Plant. Power Plant Eng., vol. 27, no. 17, Sept. 1, 1923, pp. 857–866, 16 figs. Describes new power plant of Nat. Biscuit Co. at Buffalo, N. Y. and its equipment; contains two Babcock & Wilcox boilers, each of 2065 sq. ft. heating surface; Skinner universal uniflow engine-driven generator sets.

Test Code for. Test Code for Stationary Steam-Generating Units. Mech. Eng., vol. 45, no. 9, Sept. 1923, pp. 548–558 and 565. Preliminary draft of another code in series of 19 being formulated by A.S.M.E. Committee on power test codes.

BOILERS

Design. Boiler Design and Furnace Maintenance, William Sidney Corner. Indus. Australian & Min. Standard, vol. 70, nos. 1805 and 1806, July 5 and 12, 1923, pp. 17–19 and 56–58, 5 figs. Particulars of some boiler installations; boiler settings; arch maintenance; side walls, etc.; baffles; secondary combustion; water-cooled backs; firebricks. Abstract of paper read before Instn. Engrs., Australia.

Heating, Fuels for. Comparative Tests of By-Product Coke and Other Fuels for House-Heating Boilers, Henry Kreisinger, John Blizard, H. W. Jarrett, and J. J. McKitterick. U. S. Bur. Mines, Technical Paper 315, 1923, 21 pp., 10 figs. Results of tests made to compare by-product coke, bituminous coal and anthracite as fuels for small boilers. One of series of reports disseminating information regarding fuels best adapted for heating houses. Bibliography.

High-Pressure. High Pressure Steam Boilers, D. S. Jacobus. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 335–347, 3 figs. Describes development and operation of series boilers; in latest boilers for high-pressure and high-temperature superheated steam built by Babcock & Wilcox Co., superheater is placed above series of tubes in drop leg and below main body of tubes of boiler.

Joint Standards. Standards for Tongue and Groove Joints. Power Plant Eng., vol. 27, no. 17, Sept. 1, 1923, pp. 877–878, 1 fig. Recommendations by Olaf E. Oleson for standardization of flanges and bolting for steam service.

Oil Burning, Conversion to. War Department Turns to Fuel Oil, W. W. Bowman. Power, vol. 58, no. 9, Aug. 28, 1923, pp. 327–329, 3 figs. A high record of gross and net combined boiler and furnace efficiency test with varying loads.

BRAKES

Air. Electric Road Operation and Maintenance of Air Brakes, F. A. Miller. Pacific Ry. Club—Jl., vol. 7, no. 3, June 1923, pp. 28–32 and (discussion) 33–36. History of development, applications to different types of cars; maintenance and handling.

Steam Road Operation and Maintenance of Air Brakes, C. H. Holdredge. Pacific Ry. Club—Jl., vol. 7, no. 3, June 1923, pp. 25–27. Relation between maintenance and handling; time and braking ratio.

The Development of the Air Brake for Steam Road and Traction Uses, V. Villette. Pacific Ry. Club—Jl., vol. 7, no. 3, June 1923, pp. 3, 5, 7, 9, 11, 13, 15–17, 19–24, 6 figs. Historic paper outlining air-brake development; relation to steam railroads and traction service; many different types; locomotive equipment; traction brake equipment.

Freight-Train. Continuous Brakes for Goods Trains. Engineer, vol. 136, no. 3530, Aug. 24, 1923, pp. 192–194, 3 figs. Position it occupies in different countries other than United States. Table showing capital spent on automatic-vacuum-brake-fitted goods stock, and anticipated savings if fully operated.

BRASS

Extrusion. Swaging Brass Articles—Role of Extrusion (L'emboutissage des pièces en laiton—Rôle de l'écrouissage), Albert Portevin. Revue de Métallurgie, vol. 20, no. 5, May 1923, pp. 320–329, 25 figs. Successive stages of swaging; effect of manufacturing methods on microstructure; calculating tools for cartridge cases; etc.

BRONZE

Castings. Effect of Heat Treatment on Release of Stress in Bronze Castings, Robert J. Anderson and Charles H. Eldridge. Am. Inst. Min. & Met. Engrs.—Trans., no. 1259-N, Aug. 1923, 13 pp., 8 figs. and (abstract) Min. & Metallurgy, vol. 4, no. 200, Aug. 1923, p. 428. Results of experiments carried out in Bur. of Mines in studying effect of heat treatment on release of internal stresses in bronze castings; experiments on cast bronze rings of nominal composition 87:7.5:1 copper-tin-zinc-lead showed that heating for 1 hr. at 550 deg. cent. was sufficient for removal of internal stresses up to 11,200 lb. per sq. in.

C

CAR LIGHTING

Batteries, Repair of. Battery Repair Methods on the C. B. & O. Ry. Age, vol. 75, no. 9, Sept. 1, 1923, pp. 379–381, 7 figs. New system results in more efficient service and marked economy of operation; overway track system expedites handling of batteries.

CARBURETORS

Kerosene. Self-Contained Kerosene Carburetor Developed in England. Automotive Industries, vol. 49, no. 9, Aug. 30, 1923, pp. 436–437, 2 figs. Exhaust-heated manifold not needed with new product which is smaller than other units of this type and is similar in some respects to Packard fuelizer. Engines fitted with self-contained kerosene carburetor claimed to consume less fuel and produce more power. Abstract from Engineering.

[See also MOTOR TRUCKS, Carburetor Adjustment.]

CARS, FREIGHT

Narrow-Gage Lines. Freight Cars for Narrow-Gage Lines (Matériel à marchandises des Réseaux à Voie étroite), M. Michaut. Industrie des Tramways, vol. 17, no. 198, June 1923, pp. 216–219, 4 figs. Details of design and construction of 4500-kg. car of 10-ton carrying capacity.

CARS, PASSENGER

Steel. The New Steel Cars of the Italian State Railways (Le Nuove Carrozze di acciaio delle Ferrovie dello Stato Italiane), R. Mariani. Rivista Tecnica delle Ferrovie Italiane, vol. 24, no. 12, July 15, 1923, pp. 1–15, 14 figs. Details of design, carriage frames, buffers, couplings, corridors, and interior equipment.

CAST IRON

Graphite Flakes in. Graphite Form in Gray Iron, J. W. Bolton. Foundry, vol. 51, nos. 16 and 17, Aug. 15 and Sept. 1, 1923, pp. 658–664 and 699–703, 39 figs. Author offers proof that forms of combined carbon determine first arrangment of graphite flakes; distinguishes between two forms of graphite flakes and names these "primary" and "secondary." Points out some of simpler foundry applications of microscopic study based on actual problems; effects of operating conditions must be considered when drawing conclusions from metallography.

Synthetic. Manufacture of Pearlitic Grey Cast Iron in the Electric Furnace. Foundry Trade Jl., vol. 28, no. 363, Aug. 2, 1923, pp. 95–96, 4 figs. Synthetic production of cast iron, and especially pearlitic iron, in electric furnace at Brown, Boveri & Co.'s works in Baden. Translated from article by Dr. H. Frei in Die Giesserei for July 12, 1923.

CASTINGS

Repair. Repairing Broken Castings, Walter J. May. English Mechanic & World of Sci., vol. 118, no. 3046, Aug. 10, 1923, pp. 35–36, 5 figs. Welding, brazing, soldering, riveting, and other methods.

CENTRIFUGES

Developments. Centrifugal Separation. Chem. & Met. Eng., vol. 29, no. 11, Sept. 10, 1923, pp. 459–464, 7 figs. Contains following articles: Is There a Centrifugal Solution for Your Production Problem? Lee H. Clark; A New Field for the Centrifuge? Oliver C. Ralston.

CHAIN DRIVE

Applications of. Field of the Silent Chain Drive in Power Transmission, D. I. Wheeler. Belting, vol. 22, no. 6, June 1923, pp. 36–38, 1 fig. Discusses four classes of application, the line shaft, individual machine, auxiliary unit, and miscellaneous.

Direction of Chain Travel. Direction of Chain Travel in Silent Chain Drives, D. I. Wheeler. Belting, vol. 23, no. 2, Aug. 1923, pp. 56 and 58, 5 figs. Tight strand on bottom preferable when conditions are normal, as in belt drives; unusual conditions, however, will require tight side on top.

CHIMNEYS

Foundations. Chimney Foundations, W. Wallace Christie. Power, vol. 58, no. 12, Sept. 18, 1923, pp. 459–460. Describes proportioning of foundations for various conditions, both favorable and otherwise.

Sizes. The Determination of Chimney Sizes, Alfred Cotton. Mech. Eng., vol. 45, no. 9, Sept. 1923, pp. 531–537 and 569, 21 figs. Describes simple and orderly system for determining sizes of chimneys, and presents charts giving static draft and maximum capacity of chimneys up to 500 ft. high and 25 ft. diam., from which working draft and capacity are found by means of fundamental curve; other charts give factors for various atmospheric temperatures, for altitudes, and for approximate work based on boiler horsepower. (Abridged.)

CHROME-NICKEL STEEL

Change Points in. The Change Points in Some Nickel Chromium Steels, W. T. Griffiths. Iron & Steel Inst.—Advance Paper, no. 7, for Meeting, Sept. 1923, 34 pp., 19 figs. partly on supp. plates. Investigation to ascertain effect on position of point of varying relative proportions of carbon, nickel, and chromium in these steels, other variables being kept as constant as possible.

CHUCKING MACHINES

Automatic. An Improved Automatic Chucking Machine, Frank E. Bardrof. Am. Mach., vol. 59, no. 12, Sept. 20, 1923, pp. 425–428, 7 figs. A 6 by 6¾-in. machine made by Goss & DeLeeuw Machine Co.; comparatively small and compact design; small turret feed cam and unique threading device.

COAL

Briquetting. Manufacturing Fuel by the Pure Coal Briquette Process, C. H. S. Tupholme. Chem. & Met. Eng., vol. 29, no. 10, Sept. 3, 1923, pp. 401–403, 2 figs. Method of low-temperature carbonization which depends for success on preparation of coal prior to carbonizing; results of tests on coke thus obtained and figures on production costs.

Comparing Heating Values. Effective B.t.u. and Cost Determine Value of Coal, A. Bement. Power, vol. 58, no. 12, Sept. 18, 1923, pp. 448–450. New method proposed for comparing heating values effective to furnace of different coals; cost delivered and effects of moisture and ash are considered; using best

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* Brownell Co.
* Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
* Harrisburg Fdry. & Mach. Wks.
* Leffel, James & Co.
* Sturtevant, B. F. Co.
* Troy Engine & Machine Co.
* Westinghouse Electric & Mfg. Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
* Harrisburg Fdry. & Mach. Wks.
Hooven, Owens, Rentschler Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engine, Steam, High Speed
* American Blower Co.
* Brownell Co.
* Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
* Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engines, Steam, Throttling
* Brownell Co.
* Clarage Fan Co.
* Engberg's Electric & Mech. Wks.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
* Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.
Ridgway Dynamo & Engine Co.

Engines, Steam, Variable Speed
* Brownell Co.
* Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
* Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Croll-Reynolds Engrg. Co. (Inc.)
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Exhaust Heads
Hoppes Mfg. Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
* Clarage Fan Co.
* Sturtevant, B. F. Co.

Exhausters, Gas
* American Blower Co.
* Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.
* Sturtevant, B. F. Co.

Extractors, Centrifugal
Tolhurst Machine Works

Extractors, Oil and Grease
* American Schaeffer & Budenberg Corp'n
* Kicley & Mueller (Inc.)

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

Fans, Exhaust
* American Blower Co.
* Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
Philadelphia Drying Mchry. Co.
* Sturtevant, B. F. Co.

Fans, Exhaust, Mine
* Sturtevant, B. F. Co.

Feeders, Pulverized Fuel
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Filters, Air
Midwest Steel & Supply Co. (Inc.)

Filters, Gravity
* Permutit Co.

Filters, Oil
* Bowser, S. F. & Co. (Inc.)
Elliott Co.
* General Electric Co.

Filters, Pressure
* Graver Corp'n
* Permutit Co.

Filters, Water
Elliott Co.
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

coal as standard, other grades of coal are compared, and their relative values as fuel determined.

COAL HANDLING

Bridge Control. A System of Coal and Ore Bridge Traverse Control for Protection Against Wind and Skewage Hazards of Skew Type Direct Current Bridges, P. R. Canney. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 425–447, 12 figs. Points out common and special hazards resulting from traversing operation, and describes system of control designed to afford protection against such hazards.

Conveyors for Power Plants. Coal Conveyors for Modern Power Plants, J. E. Borland. Power Plant Eng., vol. 27, no. 18, Sept. 15, 1923, pp. 917–921, 6 figs. Coal-handling equipment for storing, reclaiming and distribution to boilers.

Loading Machines. Good Results Secured with Loading Machines. Coal Industry, vol. 6, no. 8, Aug. 1923, pp. 351–353, 4 figs. West Virginia mine secures large tonnage with loading machines; iron pipe and conveyors used to transport coal down mountain side.

COKE

Improvement of Quality. Methods for Improving the Quality of Coke (Wege zur Verbesserung der Koksbeschaffenheit), A. Thau. Stahl u. Eisen, vol. 43, no. 35, Aug. 30, 1923, pp. 1127–1136, 41 figs. on supp. plates. Forms of carbon in coke; necessary preparation of coke coal; effect of coal dust as addition; flotation process; phenomena in coke oven and conclusions therefrom; surface formation of coke in beehive and chamber ovens; low-temperature coke or semi-coke; examples showing possibility of improving quality of coke.

COMBUSTION

Gaseous. Gaseous Combustion at High Pressures: New Experiments, William A. Bone. Gas J., vol. 161, nos. 3141, 3142 and 3143, July 25, Aug. 1 and 8, 1923, pp. 363–365, 415–416 and 475–477, 14 figs. Features of combustion of hydrogen and carbon monoxide in air; high-pressure experiments; carbon-monoxide-air and hydrogen-air pressure curves; combustion of carbon monoxide.

Surface. Surface Combustion and Its Application, W. M. Hepburn. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 497–512, 11 figs. Exposition of particular principles and applications employed by Surface Combustion Co.

CONDENSERS, STEAM

Surface. Determining Efficient Operation and Causes of Low Vacuum in Surface Condensers, S. Thomas. Power, vol. 58, no. 11, Sept. 11, 1923, pp. 416–417, 1 fig. Excessive air leakage quickly found by applying operating readings to accompanying chart; discusses checking proper amount of cooling water and conditions of tubes.

CONVEYORS

Steel-Belt. New Wisconsin Pulverizing Plant has Steel Conveyor Belt, George M. Earnshaw. Rock Products, vol. 26, no. 17, Aug. 25, 1923, pp. 37–40, 11 figs. Description of new pulverizing plant of Waukesha Lime & Stone Co., which is connected with crushing plant by steel-belt conveyors.

CORROSION

Aluminum. The Effect of Water Glass on the Corrosion of Aluminium by Alkalis. Metal Ind. (Lond.), vol. 23, no. 7, Aug. 17, 1923, pp. 125–126. Experiments carried out to determine effect of water glass on corrosion of aluminum by alkalis; action of potassium sulphide; effect of heat on protective coating of water glass.

COST ACCOUNTING

Industrial. Industrial Cost Accounting for Executives, Paul M. Atkins. Am. Mach., vol. 57, nos. 19, 20, 22 and 26, Nov. 9, 16, 30 and Dec. 26, 1922, pp. 727–729, 773–775, 833–835 and 991–996 and vol. 58, nos. 1, 7, 9, 11, 15, 19, 21 and 25, Jan. 4, Feb. 15, Mar. 1, 15, 29, Apr. 12, May 10, 24 and June 21, 1923, pp. 39–41, 257–261, 337–341, 407–410, 481–484, 541–545, 697–699, 765–768 and 897–890, 44 figs. Nov. 9: Outline of problem. Nov. 16: Setting selling prices; controlling methods of manufacture and expense; determining profitable lines. Nov. 30: Elements of manufacture costs; direct material, labor and charges; burden. Dec. 28: Business functions and their organization; designation by mnemonic symbols; organization chart. Jan. 4: Organization manual; contracts and duties of cost department. Feb. 15: Production control. Mar. 1: Material records and control; determining maximum and minimum quantities; purchasing, receiving and issuing material. Mar. 15: Pricing of material; simplifying inventory problem; methods of pricing. Mar. 29: Recording value of material; voucher register for stores purchased; accounts to be operated for materials withdrawn. Apr. 12: Calculation and distribution of payroll; systems of rating piecework; recording time elapsed on job. May 10: Classification of expenses; expense manual and its operation. May 24: Depreciation and other fixed charges; controlling and subsidiary acounts; preparation of journal entries. June 21: Manufacturing expenses; recording wages and salaries. Continued in vol. 59, nos. 1, 2, 4, 5, 7, 8, 10 and 12, July 5, 12, 26, Aug. 2, 16, 23, Sept. 6, 1923, pp. 15–17, 53–55, 143–145, 175–177, 259–262, 297–299, 377–379 and 449–452, 8 figs. July 5: Composition and disposition of administrative and selling expenses; outside service costs; analysis of advertising. July 12: Classification, recording and controlling of expense accounts; use of expense ledger. July 26: Budgeting of expenses; uses and development of expense schedules; scheduling of maintenance, power, supply, wage and salary costs. Aug. 2: Interest as element of cost; influence of attitude of executive. Aug. 16: Expense distribution; stepladder and direct distribution methods of allocating expense. Aug. 23: Earned and unearned burdens. Sept. 6: Direct labor charge and hour methods of allocating burden. Sept. 20: Machine rate method of allocating burden.

Uniform. Value of Uniform Cost Accounting, S. I. Whitestone. Elec. Times, vol. 64, no. 1660, Aug. 9, 1923, pp. 143–144. Establishing cost-accounting service for trade associations.

COUNTERBORES

Sizes for Railway Work. Solid Counterbore Sizes for Railroad Work. West. Machy. World, vol. 14, no. 8, Aug. 1923, pp. 266–267, 3 figs. Practice of Sacramento shops of Southern Pacific Co. in respect to solid counterbores ranging up to 3 in. in diameter.

CRANES

Girders for. Geometric Study of Rigid Supporting Girders (Contribution à l'etude géométrique du portique rigide), D. Wolkowitsch. Technique Moderne, vol. 15, no. 15, Aug. 1, 1923, pp. 462–468, 8 figs. Methods of calculation of rigid supporting girders for cranes and hoisting machinery.

CYLINDERS

Thin, Wall Stresses in. Stress Induced by Increasing Load—Specially in a Cylinder Wall Subjected to Internal Explosion, Tetsuji Sugihara. Tohoku Imperial Univ.—Technology Reports, vol. 3, no. 3, 1923, pp. 57–65, 4 figs. Thin cylinder subjected to sudden explosion of gases in it is treated; numerical examples show that in case of aero-engine cylinder effect of increased pressure on stress induced in cylinder wall is very small.

D

DIE CASTING

Aluminum. Producing Aluminum Die-Castings at Hamilton, L. J. Robinson. Can. Foundryman, vol. 14, no. 8, Aug. 1923, pp. 20–21, 4 figs. Data on operations and processes involved in making of aluminum die castings at plant of Tallman Brass and Metal, Ltd., Ontario.

DIES

Fan Bases. Drawing and Perforating Dies for Fan Bases, Robert Barry Hickey. Machy. (N. Y.), vol. 30, no. 1, Sept. 1923, pp. 7–11, 9 figs. Procedure in designing dies for electric fan base.

Self-Opening. Evolution of the Self-Opening Die, O. S. Marshall. Am. Mach., vol. 59, no. 8, Aug. 23, 1923, pp. 301–303, 9 figs. Four stages of evolution; early experiments with split dies; Sellers bolt-threading machine; modern self-opening diehead.

Square-Parts Production. Dies for Producing a Square Part, J. Bingham. Machy. (N. Y.), vol. 30, no. 1, Sept. 1923, pp. 22–24, 8 figs. Procedure and dies used in manufacturing bottom of a square coffee grinder, and in assembling this part to body of grinder.

DIESEL ENGINES

Compressorless. Investigation on the Diesel Engine (Untersuchungen an der Dieselmaschine), Kurt Neumann. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 25, June 23, 1923, pp. 755–761, 12 figs. Comparative tests on atomizing by compressed air for compressorless operation.

Four-Stroke. Increasing the Efficiency of the Four-Stroke Diesel Engine (Leistungserhöhung der Viertakt-Dieselmotoren), W. Riehm. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 31, Aug. 4, 1923, pp. 763–766, 11 figs. Details of experiments and results obtained; by pre-compressing air efficiency may be increased 30 to 35 per cent with suitable fuel consumption; exhaust gases may be used for pre-compressing.

M. A. N. Features of the 12,000 Hp. M. A. N. Engine. Motorship, vol. 8, no. 9, Sept. 1923, pp. 629–631, 4 figs. Big double-acting marine set, built at Nuremburg, tried out under severe conditions.

Power-Cost Reduction with. Oil Engines Reduce Power-Plant Costs, L. H. Morrison. Power, vol. 58, no. 12, Sept. 18, 1923, pp. 455–457, 5 figs. Additions of two Diesels at 1600-kw. municipal plant, Freeport, N. Y., effected saving of $19,000 a year, based on costs with existing steam units.

Schneider Marine. Recent Schneider-Diesel Oil Engines. Engineer, vol. 136, no. 3528, Aug. 10, 1923, pp. 156–158, 6 figs. partly on p. 152. Particulars of 1500-b.hp. marine Diesel engines.

DRAWINGS

Checking. Checking Outline for Tool Drawings, Herbert W. Cable. Am. Mach., vol. 59, no. 8, Aug. 23, 1923, p. 300. Presents suggestive outline for checking drawings developed by author.

DRILLING MACHINES

Multiple-Spindle. Straight Line Multiple Spindle Drill Heads. Eng. Production, vol. 6, no. 131, Aug. 1923, pp. 350–353, 8 figs. Details of entirely new range of appliances designed by George Hey of Adamant Eng. Co., Luton.

Portable. 3-Ft. 9-In. Portable Universal Drilling Machine. Engineering, vol. 116, no. 3009, Aug. 31, 1923, p. 266, 1 fig. Is of wide adaptability and a very serviceable tool; constructed by William Asquith, Ltd., Halifax.

DYNAMOMETERS

Campbell-Twamley. Campbell-Twamley Dynamometer, William A. Twamley. Army Ordnance, vol. 3, no. 19, July-Aug. 1923, pp. 47–48, 2 figs. Self-contained unit of hydraulic-cylinder type, in which oil is used as the medium; comprises four principal parts, the chassis, the hydraulic cylinder, the measuring device, and the recording instrument.

Horse Testing. A New Dynamometer for Testing Horses, E. V. Collins. Agricultural Eng., vol. 4, no. 8, Aug. 1923, pp. 123–124, 2 figs. Device developed at Iowa Agricultural Experiment Station. Factors influencing work output of horse.

E

EDUCATION, ENGINEERING

Practical Training. Training of Engineers (Zur Ingenieurerziehung), G. M. Strobl. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 32, Aug. 11, 1923, pp. 785–788. Importance of training manufacturers; proposes centralization manufacturing at individual points in Germany; cities examples of America; amelioration of students' distress.

ELECTRIC FURNACES

Arc. Arc Furnace Operation Flexible, J. L. McK. Yardsley. Foundry, vol. 51, no. 17, Sept. 1, 1923, pp. 694–698 and 709, 6 figs. Six-ton Ludlum electric furnace installed for production of steel and iron castings and melting down nickel-steel scrap; problems in locating, equipping, and operating the furnace.

Controlling Power Input. Controlling the Power Input to Furnaces, E. B. Dawson. Forging—Stamping—Heat Treating, vol. 9, no. 8, Aug. 1923, pp. 340–342, 6 figs. Discusses various methods used for controlling power input to resistance furnaces used for smelting, melting, refining and heat treating.

Development. The Electric Furnace (Le Four Electrique), Maurice Perrin. Fonderie Moderne, vol. 17, Feb. 1923, pp. 33–40. Historical review of development of various types of arc furnaces.

Economy. Electrical Heating for Industrial Purposes, Hamlyn Drake. Practical Engr., vol. 68, no. 1902, Aug. 9, 1923, pp. 81–82. Sums up advantages of electric furnace which, it is claimed, more than compensate for greater fuel cost per B.t.u.

Industrial Applications. The Industrial Applications of the Electric Furnace, E. W. Lewis. Engineering, vol. 116, no. 3009, Aug. 31, 1923, pp. 257–259. Design; iron-ore smelting, steel manufacture, fixation of atmospheric nitrogen and ammonia oxidation, automobile industry, calcium-carbide manufacture, glass annealing and silica industries, etc.

Internally Heated. Internally Heated Electric Furnaces. Electricity, vol. 37, no. 1707, July 27, 1923, pp. 389–390, 2 figs. Describes new furnaces of Automatic & Elec. Furnaces, Ltd., Eng., built on unit principle with inside or exposed heating coils, designed to permit construction of electric furnaces of unlimited size.

Iron-Ore Reduction. The Direct Reduction of Iron Ores in the Electric Furnace, William Mason. Elec. Rev., vol. 93, no. 2384, Aug. 3, 1923, pp. 190–191, 1 fig. Details of Chaplet Neo-Metallurgic arc furnace, which works similarly to small blast furnace.

Melting. Capacities of Electric Melting Furnaces, Frank W. Brooke. Fuels & Furnaces, vol. 1, no. 5, Sept. 1923, pp. 355–357. Factors affecting capacity; choosing electrical capacity.

Phenomena of. Electric Furnace Phenomena, Edward T. Moore. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 529–582, 33 figs. partly on supp. plates. Account of investigations on standard 6-ton counterweight-type Heroult furnace; tests were conducted at works of Halcomb Steel Co., Syracuse, N. Y. Includes appendices on oscillograph, high-speed photography, measurement of rectified current, temperature around electric furnaces and electrodes, cooling water, resistance of electrodes and electrode joints, etc.

Size and Operating Costs. Size of Furnace Affects Costs, Larry J. Barton. Foundry, vol. 51, no. 18, Sept. 15, 1923, pp. 742–743. Conditions which govern selection of size of furnace; operating costs for large and small installations, based on output; little difference is found in costs per ton.

Steel. Electric Furnace Demonstrates Flexibility in Steel Foundry, J. L. McK. Yardley. Elec. World, vol. 82, no. 10, Sept. 8, 1923, pp. 479–484, 4 figs. Successful results obtained during good and bad operating conditions; location of furnace, selection of auxiliaries, acid vs. basic linings and detailed operating results.

ELECTRIC LOCOMOTIVES

Direct-Current. New Express Electric Locomotive for the Paris-Lyons-Mediterranean Railway. Ry. Gaz., vol. 39, no. 6, Aug. 10, 1923, pp. 192–193, 2 figs. Data on 1500-volt d.c. locomotive designed to be capable of hauling heavy trains on grades of 1 in 33, and on curves having minimum radius of 395 ft.

European. Mechanical Parts of European Electric Locomotives, H. A. Kjelsberg. Ry. Elec. Engr., vol. 14, no. 8, Aug. 1923, pp. 243–244, 2 figs. Clearances and other physical limitations said to greatly affect design of motive power; details of frames, brakes, drive, equalization; general features.

Maintenance. Electric Locomotive Maintenance on the New Haven, H. Y. Morris. Ry. Elec. Engr., vol. 14, no. 8, Aug. 1923, pp. 245–248, 6 figs. Inspections made at Stamford on basis of 2500 miles' service; heavy repairs made at Van Nest shops.

ELECTRIC RAILWAYS

Battery-Charging Plant. Boston & Maine Installs

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

* Permutit Co.
* Scaife, Wm. B. & Sons Co.

Filtration Plants
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Fire Brick, Fire Hydrants, etc.
(See Brick, Hydrants, Fire, etc.)

Fittings, Ammonia
* Crane Co.
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Fittings, Compression
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Fittings, Flanged
* Builders Iron Foundry
* Central Foundry Co.
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* U. S. Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Fittings, Hydraulic
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Vogt, Henry Machine Co.

Fittings, Pipe
* Barco Mfg. Co.
* Central Foundry Co.
* Crane Co.
Kennedy Valve Mfg. Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Vogt, Henry Machine Co.

Fittings, Steel
* Crane Co.
* Edward Valve & Mfg. Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Vogt, Henry Machine Co.

Flanges
* American Spiral Pipe Works
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Vogt, Henry Machine Co.

Floor Stands
* Chapman Valve Mfg. Co.
* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

Flooring, Rubber
* United States Rubber Co.

Flour Milling Machinery
* Allis-Chalmers Mfg. Co.

Fly Wheels
* Medart Co.
* Nordberg Mfg. Co.
* Wood's, T. B. Sons Co.

Forges
* Best, W. N. Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Foundry Equipment
Northern Engineering Works
* Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnaces, Annealing and Tempering
* Best, W. N. Corp'n
* General Electric Co.
* Kenworthy, Chas. F. (Inc.)
* Whiting Corp'n

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
* Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Detroit Electric Furnace Co.
* Kenworthy, Chas. F. (Inc.)

Furnaces, Forging
* Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
* Kenworthy, Chas. F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Corp'n
* General Electric Co.
* Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Corp'n
Detroit Electric Furnace Co.
* General Electric Co.
* Whiting Corp'n

Furnace, Non-Ferrous
Detroit Electric Furnace Co.

Furnaces, Non-Oxidizing
* Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
Best, W. N. Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Herbert Boiler Co.
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
Johns-Manville (Inc.)

Gage Boards
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gage Glasses
* American Schaeffer & Budenberg Corp'n

Gage Glasses, Inclined
Sesure Water Gauge Co.

Gage Testers
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gages, Altitudes
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gages, Ammonia
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Vogt, Henry Machine Co.

Gages, Differential Pressure
* American Schaeffer & Budenberg Corp'n
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Uehling Instrument Co.

Gages, Draft
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gages, Liquid Level
* Bristol Co.
Lunkenheimer Co.
* Simplex Valve & Meter Co.

Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
* Norma Co. of America

Gages, Pressure
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Vacuum
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Simplex Valve & Meter Co.

Gages, Water Level
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
Lunkenheimer Co.
* Simplex Valve & Meter Co.

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Iron, Corrugated
Smooth-On Mfg. Co.

Gaskets, Rubber
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Gasoline
Texas Co.

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mach. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mach. Co.

Gears, Cut
* Brown, A. & F. Co.
Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Philadelphia Gear Works
* Poole Engrg. & Mach. Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Herringbone
* Falk Corporation

Gears, Machine Molded
* Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.
Philadelphia Gear Works

Gears, Speed Reduction
Chain Belt Co.
* De Laval Steam Turbine Co.
* Falk Corporation
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
* Kerr Turbine Co.
Link-Belt Co.
* Poole Engrg. & Mach. Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Gears, Worm
Chain Belt Co.
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
* Clarage Fan Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Nordberg Mfg. Co.
Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Governors, Engine, Oil
* Nordberg Mfg. Co.

Governors, Engine, Steam
* Nordberg Mfg. Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.)
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Kieley & Mueller (Inc.)

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co.

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grates, Rocking
* Brownell Co.

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Greases
* Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Grinding Machinery
* Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Guards (Electric Lamp)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Franklin Machine Co.
* Long & Allstatter Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Battery Charging Plant, Ry. Elec. Engr., vol. 14 no. 8, Aug. 1923, pp. 239–242, 10 figs. New plant has capacity to take care of charging of ten cars at one time.

Concrete, Uses on. Concrete on Electric Railways, D. A. Tomlinson. Elec. Traction, vol. 19, no. 8, Aug. 1923, pp. 388–393, 11 figs. Methods, designs and uses of concrete on modern traction systems; track construction; paving base; types of tracks; etc.

Current Collection by Contact System. Contact System for Collecting Large Currents. Ry. Elec. Engr., vol. 14, no. 8, Aug. 1923, pp. 229–231, 6 figs. Single pantagraph used to collect 5400 amperes at 58 mi. per hr. without sparking.

Energy Consumption, Reduction in. Energy Consumption Reduced in St. Louis, Benjamin F. Thomas, Jr. Elec. Ry. Jl., vol. 62, no. 9, Sept. 1, 1923, pp. 321–324, 6 figs. Tests made on United Rys. of St. Louis result in installation of meters on 1420 cars; definite factors found for traffic and temperature variation, completed installation has resulted in peak load as well as overall energy reduction.

ELECTRIC WELDING

Rails. Electric Rail Welding (Elektrische Schienenschweissung). Elektrotechnischer Anzeiger, vol. 40, nos. 102, 103, 104, 105 and 106, June 27, 28, 30, July 3 and 4, 1923, pp. 715–716, 721–722, 727–728, 739–740 and 745–746, 39 figs. Development of new method of electric fishplate welding as practiced by Accumulator Works Corp., Berlin, and its advantages over former method of head welding, or direct welding of rails together, practical tests of welds made; microscopic examination of structure.

ELECTRIC WELDING, ARC

Cast Iron. Arc Welding Cast Iron, C. J. Holslag. Welding Engr., vol. 8, no. 8, Aug. 1923, pp. 21–23 and 29. Various methods of making arc welds on castings without studding; use of carbon arc.

Cyc-Arc Process. Cyc Arc Welding. Automobile Engr., vol. 13, no. 179, Aug. 1923, pp. 245–249, 9 figs. Possibilities of process for automobile construction.

Ingot-Stripper Ram. Arc Welding an Ingot Stripper Ram, A. M. Candy. Forging—Stamping—Heat Treating, vol. 9, no. 8, Aug. 1923, pp. 351–352, 1 fig. Describes welding of ram 10 in. in diam. which was broken off 3 ft. from lower end.

Portable Plant for. Rail Bonding. Ry. Gaz., vol. 39, no. 7, Aug. 17, 1923, p. 225, 1 fig. Describes portable engine-driven plant manufactured by Alloy Welding Processes Ltd., London, Eng., for Union of So. African Rys., primary purpose of which is bonding of railway lines, but which can be used for any other electric-arc-welding repair or construction work.

ELECTRICITY, APPLICATIONS OF

Heating. Use of Electricity for Heating (Die Anwendung der Elektrizität zu Heizzwecken), Edgar Zeulmann. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 25, June 23, 1923, pp. 617–622, 29 figs. Application of electricity to industrial heating, such as cooking, heating of rooms, heating of machines and tools, etc.; examples.

ELEVATORS

Cables. Strength of Used Elevator Cables, C. W. Willits. Power, vol. 58, no. 12, Sept. 18, 1923, pp. 451–454, 5 figs. Results of over 150 tests made on worn cables and 43 on wire taken from these cables.

EMPLOYEES' REPRESENTATION

National Economic League Report. Employees Participation In Management. Ry. Age, vol. 75, no. 8, Aug. 25, 1923, pp. 333–334. Report of special committee of Nat. Economic League on employee representation.

EMPLOYEES, TRAINING OF

Railway Personnel. Schools for the Training of Personnel of the German State Railway (Das Dienstschulwesen bei der Deutschen Reichsbahn), Karl Gotter. Archiv fur Eisenbahnwesen, no. 4, July-Aug. 1923, pp. 611–640. Fundamentals for organization of schools for beginners, for building and operating officials, traffic officials, machine workers, shop and administration officials.

Teaching Business Fundamentals. "Blocking" Economics for Workmen. Iron Trade Rev., vol. 73, no. 12, Sept. 20, 1923, pp. 801–802 and 804, 3 figs. How Connecticut company has found vari-colored prisms of use in teaching employees fundamentals of its business.

ENGINEERING

Developments in Great Britain. British Engineering Developments and Practice, Mark Meredith. Nat. Engr., vol. 27, no. 9, Sept. 1923, pp. 420–422. Utilization of waste heat; water-tube boilers; pulverized fuel; developments in coal-gas manufacture.

ENGINEERS

Licensing. Licensing of Engineers Declared Unconstitutional in Pennsylvania. Min. & Metallurgy, vol. 4, no. 200, Aug. 1923, pp. 413–414. Judge Samuel E. Schull, in Court of Quarter Sessions of Monroe County Pa., handed down a decision on July 2, declaring Pennsylvania law for licensing of professional engineers and land surveyors to be in violation of Constitution of State of Pennsylvania and also of 14th amendment of Constitution of United States; quotes in full part of decision referring to unconstitutionality of act.

ENGINEHOUSES

Turntables. The Development of the Continuous Turntable, Otis E. Hovey. Ry. Age, vol. 75, no. 7, Aug. 18, 1923, pp. 295–298, 7 figs. American Bridge Co.'s newest design and comparison with earlier types.

EVAPORATORS

Calculation. Study of Evaporating Apparatus (Étude sur quelques appareils d'évaporation), Association des Chimistes—Bul., vol. 60, no. 10, Apr. 1923, pp. 406–422, 1 fig. Describes experiments with tubular evaporators, including boilers; evaporating 110,000 kg. per day; develops formulas to express mathematically velocity of liquid and steam in ascending; volume of liquid displaced in forced circulation; speed necessary for heat transmission to give a good evaporation at minimum cost of power.

Vacuum. Low Pressure Vacuum Evaporators, C. A. Jones and A. M. Charlton. Am. Soc. Naval Engrs.—Jl., vol. 35, nos. 2 and 3, May and Aug., 1923, pp. 329–356 and 539–544; 14 figs., partly on supp. plates. Modified Lillie evaporator, which uses "film" or "rain" evaporation. Description of system and its advantages.

F

FANS

Centrifugal. Centrifugal Fan Types ("Typification" des ventilateurs centrifuges), A. Lambrette. Technique Moderne, vol. 15, nos. 12 and 13, June 15 and July 1, 1923, pp. 364–368 and 397–405, 34 figs. Classification of fans; characteristics, properties, advantages and drawbacks of each type; selection of proper type for given purpose; design and construction.

Mine. The Design of Mine Fans, D. W. Rees. Colliery Guardian, vol. 126, no. 3267, Aug. 10, 1923, pp. 333–334. Attempt is made to summarize principles of fan design, which can be further amplified by further testing; outline of proposed method of testing.

FIRE FIGHTING

Factory Brigade. The Advantages and Organisation of a Works Fire Brigade, Eric N. Simons. Indus. Management (Lond.), vol. 10, no. 5, Sept. 6, 1923, pp. 121–123. Emphasizes advisability of modern works or factory possessing its own trained fire brigade for dealing with outbreak of fire in its early stages.

FLIGHT

Gliding. Mechanism of Airplane Gliding and Morphology of Gliding Birds (Sur le mecanisme du vol á voile et la morphologie des oiseaux voiliers) Charles Nordmann. Académie des Sciences—Comptes Rendus, vol. 177, no. 8, Aug. 20, 1923, pp. 446–448. Distinguishes between problem of propulsion and that of sustaining. Develops new theory on flight of birds.

FLUE-GAS ANALYSIS

Developments. Recent Developments in Flue-Gas Analysis, E. H. Lockwood. Power, vol. 58, no. 12, Sept. 18, 1923, pp. 461–462. Flue-gas computations reduced to simple formulas based on gas analysis; computing percentage of excess air; formula for checking Orsat analysis.

FLYING BOATS

C. A. M. S. Les Chantiers Aero-Maritimes de la Seine. Flight, vol. 15, no. 30, July 26, 1923, pp. 438–440, 3 figs. Details of machines produced at C. A. M. S. works at St. Denis, with special reference to C. A. M. S. 33. T. twin-engined commercial flying boat.

FOUNDRIES

Costs. Foundry Costs Simplified, Alfred Baruch. Foundry, vol. 51, nos. 16, 17 and 18, Aug. 15, Sept. 1 and 15, 1923, pp. 653–656, 710–713 and 749–750, 3 figs. Aug. 15: Methods for arriving at and distributing indirect expense; expense orders are classified numerically; general expenses determined on annual basis for distribution. Sept. 1: Methods outlined for determining burden charge, blanket rate being the one most often used. Sept. 15: Steps taken in carrying through order to clarify details given in previous articles.

Foundry Costing, Thomas Bancroft. Foundry Trade Jl., vol. 28, no. 364, Aug. 9, 1923, pp. 113–115. Fundamental principles are advocated such as could be adopted by foundry trade in general.

Electrification. The Complete Electrification of the Foundry Industry, Leonard W. Egan. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 381–424, 7 figs. Discusses possibilities of electrified methods and systems as applied to process of molding, together with reasons why.

Steel. Steel Foundry Reflects Growth, John D. Knox. Foundry, vol. 51, no. 17, Sept. 1, 1923, pp. 704–709, 9 figs. Experience of executives of Blackwood Elec. Steel Corpn. gained over a period of many years is crystallized in building plant layout and equipment installed in new electrical steel foundry in West Virginia.

Steel Foundries and Coöperative Research, W. J. Corbett. Iron Age, vol. 112, no. 11, Sept. 13, 1923, pp. 675 and 731. Results achieved among five electric plants in operations, costs and merchandising; new uses for thin castings.

FUEL ECONOMY

Power Plants. Super-Power Plants and Coal Conservation, Egbert Douglas. Nat. Engr., vol. 27, no. 9, Sept. 1923, pp. 409–413. Discussion of fundamental principles of fuel conservation and relation of heat and power requirements.

FUELS

Utilization. Work of the Fuel Utilization Committee—Eighth Report (Travaux de la commission d'utilisation du combustible, Huitième Rapport). Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 435, no. 3, Mar. 1923, pp. 195–209. Fuel Economy in Sugar Factories, by E. Sommier; Steam Economy in the Sugar Industry, by Eugene Caron. See also Chaleur et Industrie, vol. 4, nos. 36 and 37, Apr. and May 1923, pp. 333–335 and 434–437.

Waste, Economic Combustion. The Economic Combustion of Waste Fuels, David Moffat Myers. Steam Power, vol. 2, nos. 4, 5 and 6, May, June and July 1923, pp. 8, 10 and 12; 7, 12 and 14; and 7, 12 and 14. May: Principles involved in increasing efficiency of combustion; maintenance of high temperature; mixing of air and fuel-bed gases; sawdust and wood waste. June: Composition of hog feed; furnace for burning sawdust. July: Furnace for burning tanbark.

[See also BAGASSE; COAL; COKE; OIL FUEL; PULVERIZED COAL.]

FURNACES, HEAT TREATING

Truck Plant. Heat Treating Equipment in a Truck Plant. Am. Mach., vol. 59, no. 11, Sept. 13, 1923, pp. 415–416, 2 figs. Kinds of furnaces used at Moreland Motor Truck Co. plant, Burbank, Cal.; their arrangement and sizes; carbonizing and heat treatment for different steels used in transmission.

G

GAS PRODUCERS

Ash-Fusion. Ash-Fusion Gas Producers (Le Gazogène à fusion des cendres), E. Servais. Revue Universelle des Mines, vol. 18, no. 4, Aug. 15, 1923, pp. 251–258 and (discussion) 258–260. Experiments with Ruhr Coke; concludes that low-grade coal containing up to 30 per cent ash can be gasified provided air is heated to 400 deg.

Central-Type. Central-Type Producer Plant in the Municipal Gas Works of Potsdam (Germany) (Zentralgeneratorgasanlage im Gaswerk Potsdam), B. Meyer. Gas- u. Wasserfach, vol. 66, no. 29, July 21, 1923, pp. 426–430, 8 figs. Details, operating results and economy of vertical-retort plant equipped with central producers for gasification of lignite briquets with low-temperature recovery.

Developments. Improvements in Gas Producers (Perfectionnements apportés aux gazogènes), C. Clement. Arts et Métiers, vol. 76, no. 33, June 1923, pp. 601–616, 8 figs. Describes construction, operation, heat balance, applications, etc., of various types.

Wood-Refuse. Finding a Use for Waste Wood, Johnstone Taylor. Power, vol. 58, no. 11, Sept. 11, 1923, pp. 419–420, 2 figs. Discusses advantages of gas producers using waste products; tests on producer-engine units; gas analysis.

GAS TURBINES

Puplett. An Internal Combustion Turbine. Autocar, vol. 51, no. 1452, Aug. 17, 1923, p. 281, 1 fig. Puplett design effectively water-cooled; simplicity of construction gives low production cost.

GASES

Specific Heats. Specific Heats of Gases and Vapors (Les chaleurs specifiques des gaz et des vapeurs), Aimé Witz. Revue Générale des Sciences, vol. 34, no. 14, July 30, 1923, pp. 425–435. Historic development and experimental results; present state of question and work yet to be done.

Variation of Specific Heat of Gases With Temperature (La variation de la chaleur spécifique des gaz avec la température d'après les travaux les plus récents), H. Muraour. Chimie & Industrie, vol. 10, no. 1, July 1923, pp. 23–29, 1 fig. New specific heat values obtained at Nernst laboratory, and examples of application in industry. Bibliography.

GEAR CUTTING

Hobbing. Universal Gear Hobbing Machine. Machy. (Lond.), vol. 22, no. 568, Aug. 16, 1923, pp. 632–634, 6 figs. Describes machine designed for hobbing all types of spur, spiral, and bevel gears up to 2 module, output capacity being exceptionally good, produced by Mikron Co., which is a good example of modern Swiss machine-tool design.

Instrument Gears. Cutting Instrument Gears, Franklin D. Jones. Machy. (N. Y.), vol. 29, no. 12 and vol. 30, no. 1, Aug. and Sept. 1923, pp. 951–955 and 25–27, 18 figs. Aug.: Production of small gears by means of hand-operated and automatic machines of formed-cutter and hobbing types. Sept.: Application of hobbing process and production of small pinions in rod form.

Knitting-Machine Parts. Cutting Slots in Knitting Machine Parts, Fred R. Daniels. Machy. (N. Y.), vol. 30, no. 1, Sept. 1923, pp. 44–46, 5 figs. Describes gear-cutting machines and methods at plant of Leighton Machine Co., Manchester, N. H., manufacturer of knitting machines.

GEARS

Teeth, Strength of. Factors Governing the Strength of Gear Teeth, Douglas T. Hamilton. Am. Mach. vol. 59, no. 8, Aug. 23, 1923, pp. 287–291, 3 figs. Velocity; accuracy; method of mounting; measurements and allowances for backlash.

GLUES

Tests. Colloid Chemistry in the Glue Industry (Kolloidchemie und Leimindustrie), E. Sauer. Kolloid-Zeit., vol. 33, no. 1, July 1923, pp. 40–53, 3 figs. Results of experiments to determine value of glues of animal origin as adhesives used in wood industries; details of tests for specifications.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

Hangers, Shaft
* Brown, A. & F. Co.
* Chain Belt Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball Bearing)
* Hyatt Roller Bearing Co.
* S K F Industries (Inc.)

Hangers, Shaft (Roller Bearing)
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mach. Co.

Hard Rubber Products
* United States Rubber Co.

Hardening
* American Metal Treatment Co.

Heat Exchangers
* Croll-Reynolds Engineering Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
* Croll-Reynolds Engineering Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

Heaters, Water Supply
Herbert Boiler Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.
* Erie City Iron Works
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water, Metering
* H. S. B. W.-Cochrane Corp'n

Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
* Clarage Fan Co.
Midwest Steel & Supply Co. (Inc.)
* Sturtevant, B. F. Co.

Heating Specialties
* Fulton Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.

Hoists, Air
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
Northern Engineering Works
* Shepard Elect. Crane & Hoist Co.
* Whiting Corp'n

Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n
* Yale & Towne Mfg. Co.

Hoists, Electric
* Allis-Chalmers Mfg. Co.
* American Engineering Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
* Yale & Towne Mfg. Co.

Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Locomotive & Coach
* Whiting Corp'n

Hoists, Mine
Lidgerwood Mfg. Co.
* Nordberg Mfg. Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Hoists, Steam
(See Engines, Hoisting)

Holders, Nipple
* Curtis & Curtis Co.

Hose, Acid
* United States Rubber Co.

Hose, Air and Gas
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Hose, Fire
* United States Rubber Co.

Hose, Gas
* United States Rubber Co.

Hose, Gasoline
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Hose, Metal, Flexible
Johns-Manville (Inc.)

Hose, Oil
* United States Rubber Co.

Hose, Rubber
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Hose, Steam
* United States Rubber Co.

Hose, Suction
* United States Rubber Co.

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n
Helmer Air Conditioning Corp'n
* Sturtevant, B. F. Co.

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n
Helmer Air Conditioning Corp'n
* Sturtevant, B. F. Co.

Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Worthingotn Pump & Machinery Corp'n

Hydraulic Machinery
* Allis-Chalmers Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Press Control Systems (Oil Pressure)
* American Fluid Motors Co.

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
* Taylor Instrument Cos.

Hygrometers
* Taylor Instrument Cos.
Weber, F. Co. (Inc.)

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
Johns-Manville (Inc.)
* Nordberg Mfg. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Gifford-Wood Co.

Idlers, Belt
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Indicators, CO
* Uehling Instrument Co.

Indicators, CO_2
Bacharach Industrial Instrument Co.
* Uehling Instrument Co.

Indicators, Engine
* American Schaeffer & Budenberg Corp'n
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.

Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.)

Indicators, SO_2
* Uehling Instrument Co.

Indicators, Speed
* American Schaeffer & Budenberg Corp'n
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Injectors
Lunkenheimer Co.
* Schutte & Koerting Co.

Injectors, Air
* Croll-Reynolds Engrg. Co.

Inserts, Steel
Midwest Steel & Supply Co.

Instruments, Electrical Measuring
* General Electric Co.
* Taylor Instrument Cos.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Instrument, Recording
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Baily Meter Co.
* Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
* General Electric Co.
* Taylor Instrument Cos.
* Uehling Instrument Co.
* Westinghouse Electric & Mfg. Co.

Instruments, Scientific
* Taylor Instrument Cos.
Weber, F. Co. (Inc.)

Instrument, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.
PurVell Laboratories
Weber, F. Co. (Inc.)

Insulating Materials (Electrical)
* General Electric Co.
Johns-Manville (Inc.)

Insulating Materials (Heat and Cold)
* Celite Products Co.
Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
* Croll-Reynolds Engineering Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* United States Rubber Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.
Lunkenheimer Co.

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.

Keys, Machine
* Smith & Serrell
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.
* Sturtevant, B. F. Co.

Ladles
Northern Engineering Works
* Whiting Corp'n

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
Johns-Manville (Inc.)
* Westinghouse Electric & Mfg. Co.

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
* Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Levers, Flexible (Wire)
* Gwilliam Co.

Linings, Brake
Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Corp'n
* Celite Products Co.
Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* McLeod & Henry Co.
* Quigley Furnace Specialties Co.

Linings, Stack
Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Corp'n

Loaders, Portable
* Gifford-Wood Co.
Link-Belt Co.

Lockers, Metal
Manufacturing Equip. & Engrg. Co.

Locomotives, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Locomotives, Storage Battery
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
* Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.
Lunkenheimer Co.

Machine Tool Feed Control Systems (Oil Pressure)
* American Fluid Motors Co.

Machine Work
* Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
Lammert & Mann Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Purvis Machine Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.
* Simplex Valve & Meter Co.

Mechanical Draft Apparatus
* American Blower Co.
* Clarage Fan Co.
* Green Fuel Economizer Co.
* Sturtevant, B. F. Co.

Mechanical Stokers
(See Stokers)

Metal Treating
* American Metal Treatment Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

H

HANDLING MATERIALS

Labor-Saving Equipment. Formulas for Computing Economies of Labor-Saving Equipment. Mech. Eng., vol. 45, no. 9, Sept. 1923, pp. 564–565. Committee of A.S.M.E. Materials Handling Division studies problem of evaluating labor saved by improved processes; practical application of formulas devised.

Methods. What It Pays to Know about Material Handling. W. T. Spivey. Factory, vol. 31, no. 3, Sept. 1923, pp. 303–306, 4 figs. Pneumatic, hydraulic and steam-jet methods.

Piers. Material-Handling Problems in Pier Design. Carroll R. Thompson. Mech. Eng., vol. 45, no. 9, Sept. 1923, pp. 525–530 and (discussion) 530 and 569, 7 figs. Review of proceedings of several material-handling symposiums held by A.S.M.E. to discuss material handling in its relation to port development. (Abridged.)

Tractor-Trailer Intra-Plant Haulage. Intra-Plant Haulage by Means of Railless Railroads. Matthew W. Potts. Indus. Management (N. Y.), vol. 66, no. 3, Sept. 1923, pp. 182–191, 10 figs. How time and money can be saved by tractor-trailer systems.

HARDNESS

Herbert Pendulum Tester. The Mathematical Theory of the Herbert Pendulum Hardness Tester. Wm. J. Walker. Engineer, vol. 136, no. 3532, Sept. 7, 1923, pp. 244–245, 1 fig. Critical discussion of theories set forth in E. G. Herbert's article published in same journal (June 29, 1923).

HEAT TRANSMISSION

Building Materials. Transmission of Heat in Building Materials. Times Trade & Eng. Supp. (Timber Trades Section), July 28, 1923, p. 477. Abstract of report describing experiments made at Nat. Physical Laboratory on transmission of heat through various walls and building materials.

HEATING AND VENTILATION

Development, France. Development of Industrial Central Heating and Ventilating in France During the 19th Century (Note sur l'origine et l'evolution en France au XIXe siècle de l'industrie du Chauffage central et de la Ventilation). André Nessi. Chaleur et Industrie, vol. 4, no. 36, Apr. 1923, pp. 313–316. Historical summary of successive developments in construction, operation and regulation of plants.

HEATING, GAS

Radiant Heater. Regarding Radiant Heaters. Geo. W. Jones, W. P. Yant and L. B. Berger. Gas Industry, vol. 23, no. 8, Aug. 1923, pp. 272–275, 1 fig. Combustion products from a radiant-type natural-gas heater and suggestions regarding its operations.

HOISTS

Blast-Furnace Skip. Single Bucket Blast Furnace Skip Hoist Characteristics. A. C. Cummins and A. R. Leavitt. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 449–466, 5 figs. Calls attention to principal features claimed for each of four types of drive, and presents test data secured while checking over actual performance of number of hoists to corroborate various points of superiority which each type is said to possess.

Construction. Hoisting Apparatus (Les Appareils de Levage et de Manutention à bras). Marcel Demony. Métallurgie, vol. 55, nos. 25 and 26, June 21 and July 5, 1923, pp. 893–896 and 965–968, 9 figs. Construction and utilization, including chains and chain making.

HOUSING

Workmen's Dwellings. Construction of Workmen's Dwellings at Mulhouse in 1922 (Un mot sur les constructions de maisons ouvrières à Mulhouse en 1922). Camille de Lacroix. Société Industrielle de Mulhouse—Bul., vol. 89, no. 5, May 1923, pp. 326–330, 7 figs. on supp. plates. Design of various types, single and in groups.

HYDRAULIC TURBINES

Automatically Regulated. Automatically Regulated Turbines for Medium Water Heads for Agricultural Electrification (Note sur la réalisation de turbines autorégulatrices permettant l'exploitation automatique de chutes de puissance moyenne, en vue d'alimenter des réseaux ruraux d'énergie électrique). L. Barbillion. Houille Blanche, vol. 22, no. 182, May–June 1923, pp. 93–96, 5 figs. Describes old and modern types of Fourneyron turbines; direct and indirect regulation; describes some recent installations of self-regulating turbines.

Efficiency, Determination of. Calorimetric Method for Determining the Efficiency of Hydraulic Turbines. Mech. Eng., vol. 45, no. 9, Sept. 1923, p. 545, 2 figs. Consists in merely measuring difference in temperature of water entering and leaving turbine and head employed. Translated from Génie Civil, vol. 82, no. 25, June 23, 1923, pp. 604–605.

Hydrodynamic Theory. Fundamentals of a New Hydrodynamic Theory of Hydraulic Turbines (Fondamenti di una nuova teoria idrodinamica delle turbine idrauliche). Aristide Prosciutto. Ellettrotecnica, vol. 10, nos. 12 and 13, Apr. 25 and May 5, 1923, pp. 245–251 and 270–275, 13 figs. Theories of hydraulic turbines, and details of new theory based solely on general hydrodynamic equations for relative motion with cylindrical and curvilinear coördinates; calculations; introduction of curvilinear coördinates; theory of Lorenz turbine, as special case of new theory; etc.

HYDROELECTRIC DEVELOPMENTS

Belgium. Utilizing Belgian Hydroelectric Power (Avant-projet de captation des énergies hydrauliques belges combinée avec la suppression des crues du bassin de la Meuse et la création de grandes voies navigables Meuse-Anvers). Herman Chauvin. Association des Ingenieurs Electriciens Sortis de l'Institut Electrotechnique Montefiore, vol. 1 (series 7), no. 2–3, Feb.–Mar. 1923, pp. 31–120, 15 figs. on supp. plates. Details of project to harness the various rivers for production of hydroelectric power; barrage dams and other construction work; hydrographic and financial data.

Quebec. Hydro-electric Possibilities of Quebec. Julian C. Smith. Eng. J., vol. 6, no. 9, Sept. 1923, pp. 397–400, 3 figs. Potential and actual hydro-electric development and its probable rate of growth in future.

Saguenay District, Canada. Power Development in the Saguenay District. Eng. J., vol. 6, no. 9, Sept. 1923, pp. 383–387, 8 figs. Construction of power plants and storage works; proposed dams.

Spain. Bases for Production and Distribution of Electric Energy by the State (Bases generales para la producción y distribución de energía eléctrica a realizar por el Estado). Energia Electrica, vol. 25, no. 13, July 10, 1923, pp. 165–169. Discusses Spain's water resources, and suggests that government take over all hydroelectric developments, spending one hundred millions annually for 30 years, to organize and supply necessary power for the various industries.

HYDROELECTRIC PLANTS

Australia. The Carranballac Hydro-Electric Plant, B. A. Smith. Indus. Australian & Min. Standard, vol. 70, no. 1805, July 5, 1923, pp. 14–16, 5 figs. Details of power plant and electrical equipment of power scheme for Carranballac Estate, which is situated in Western District Plains of state of Victoria, for providing power for house lighting and heating, wood cutting by circular saw, sheep shearing, pumping, milking, etc.

England. The York Hydro-electric Undertaking. Elec. Rev., vol. 93, no. 2386, Aug. 17, 1923, pp. 249–251, 8 figs. Inauguration of Linton Lock Station, said to be largest of its kind in England. Difficulties met in construction, details of plant. See also Elec. Times, vol. 64, no. 1660, Aug. 9, 1923, p. 131, 3 figs.

York's Hydro-Electric Station. Times Trade & Eng. Supp., vol. 12, no. 265, Aug. 4, 1923, p. 499, 1 fig. Station erected to supplement electricity supply of city of York by utilizing power of River Ouse. See also Engineer, vol. 136, no. 3528, Aug. 10, 1923, pp. 148–150, 10 figs.

Italy. Hydraulic Development on the Upper Barbellino (Les grande amenagements hydrauliques transalpins—L'aménagement du haut Barbellino). J. Boudet. Houille Blanche, vol. 22, no. 182, May–June 1923, pp. 81–88, 12 figs. Hydrography, water storage, pressure conduits, the Dossi central station and reservoir, construction work, etc.

Hydroelectric Plants on the S. Croce Lake (Gli impianti idroelettrici del lago di S. Croce). Elettricista, vol. 2 (series 4), nos. 13 and 14, July 1 and 15, 1923, pp. 97–100 and 105–108, 5 figs. Describes work completed and that under construction, in connection with construction of five power stations located at Fadalto, Nove, San Floriano, Castelletto, and Caneva.

Operation. The Operation of Hydro-Electric Stations. Ralph Brown. Power, vol. 58, no. 10, Sept. 4, 1923, pp. 363–366, 5 figs. How to obtain, from equipment available, maximum output with minimum consumption of water.

Switzerland. Hydro-Electric Plant with Head of Over One Mile. Fred A. Noetzli. Eng. News-Rec., vol. 91, no. 10, Sept. 6, 1923, pp. 395–396, 4 figs. Details of Swiss power plant of 12,000 hp., operating under head of practically one mile, and having a single penstock of less than 2 ft. diameter; unusual design of Pelton wheels.

Vermont. Detailed Estimate of the Cost of Davis Bridge Development. Elec. World, vol. 82, no. 11, Sept. 15, 1923, pp. 532–533. Estimate of cost of one of largest hydroelectric plants in East; probable overall expenditure of nearly $9,000,000.

Wales. Hydro-Electric Station at Cynwyd, North Wales. Engineering, vol. 116, no. 3009, Aug. 31, 1923, pp. 279–280, 10 figs. Data on small hydro-electric plant recently constructed near Cynwyd, on Trystion stream, where an impounding reservoir has been constructed holding over 1,000,000 cu. ft. water; plant comprises two turbines, one 21 in. in diam. developing 150 b.hp., and other 12 in. developing 27 b.hp.

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ICE PLANTS

Oil-Engine-Driven. An Oil-Engine-Driven Ice Plant. Power, vol. 58, no. 10, Sept. 4, 1923, pp. 375–377, 3 figs. Describes 50-ton ice plant of Red Bank, N. J., Pure Ice Mfg. Co., equipped with two 100-hp. Fairbanks-Morse semi-Diesel engines, each direct-connected to a Worthington compressor.

Operating Systems. Diamond Ice Company Power Plant, J. K. Marquis. Nat. Engr., vol. 27, no. 9, Sept. 1923, pp. 417–420, 5 figs. Combination of absorption and compression systems of refrigeration in use at plant of Diamond Ice Co. of Knoxville, Tenn. How reconstruction and overhauling of plant increased capacity and efficiency.

IMMIGRATION

United States Problem. The Immigration Problem in the United States. Nat. Indus. Conference Board—Research Report, no. 58, 130 pp., 7 figs. History and causes of European immigration; relation of immigration to American community; development of federal immigration legislation; per centum limit act in operation; review of suggestions for national immigration policy.

INDUSTRIAL MANAGEMENT

Box Manufacture. More Output: Lower Costs: Control. E. E. Ames. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 305–312, 13 figs. Management results in veneer box shop; bonus plan.

Budgetary Control. The Control of an Industry in the Business Cycle. Howard Coonley. Taylor Soc.—Bul., vol. 8, no. 4, Aug. 1923, pp. 128–136, 5 charts. Describes system of budgetary control of sales, purchases, receipts, and expenditures, employed by Walworth Co.

The Monthly Financial Budget. Joseph H. Barber. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 313–318. Budgetary procedure adopted by Walworth Manufacturing Co.

Control System. Visualized Management Control. Chester B. Lord. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 319–322, 2 figs. Describes system of management control developed by author which can be applied to any kind of varying conditions and factors and in any place.

Cost Control. The Province of the Controller. John B. Guernsey. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 323–326. Preparing formal plans and holding to them.

Job Scheduling. A Simplified Plan for Job Scheduling. Edgar H. Trick. Factory, vol. 31, no. 3, Sept. 1923, pp. 308–311, 3 figs. Describes system of shop orders successfully used by firm doing straight manufacturing business and general jobbing and repair business under same roof.

Manager, Requirements of. Some Fundamentals of Management. Alvan T. Simonds. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 297–299. Requisites of good business manager.

Paper Industry. Management Engineering in the Paper Industry. R. B. Wolf. Eng. J., vol. 6, no. 9, Sept. 1923, pp. 401–403. Measurement of performance a factor in good management; industry should be organized to encourage rather than repress individual development.

Power-Service Maintenance. Some of the Ways Procedure in Maintenance Work Can Be Audited By the Maintenance Department to Improve Standards of Power Service. Arthur J. Whitcomb. Indus. Engr., vol. 81, nos. 1, 4 and 9, Jan., Apr. and Sept. 1923, pp. 11–15 and 66, 181–186 and 426–436, 16 figs. Means of auditing incoming and outgoing electrical material, such as repairs, spare parts, etc. Power service or power distribution auditing. Accounting of work of electrical department. Accounting or record of electrical equipment.

Production Control. Controlling Production Without a Planning Department. Kenneth W. Stillman. Indus. Management (N. Y.), vol. 66, no. 3, Sept. 1923, pp. 160–162, 3 figs. Describes system whereby small plant can eliminate manifold wastes attendant upon haphazard production, without going to expense of installing separate planning department.

Production Planning. Production Planning in the Shoe Industry. Charles A. Rooker. Indus. Management (N. Y.), vol. 66, no. 3, Sept. 1923, pp. 144–148, 3 figs. Author outlines benefits to be derived from planned production in shoe industry, and shows how to get around difficulties involved.

Production Routing. Increased Profits Through Control of Costs. R. W. Darnell. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 301–304. Production routing. Cutting costs by better production routing; routing sheet; maintenance of routings; avoidance of temporary changes.

Progress Chart. The Progress Chart and the Bonus Method. B. A. Franklin. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 327–332, 8 figs. Points out that progress record or chart as illuminating and explanatory picture, with bonus for reward, fits best the ordinary demand and gets best results that are humanly possible.

Purchasing Agent and Engineer. Purchasing Agent and Engineer, W. E. Irish. Taylor Soc.—Bul., vol. 8, no. 4, Aug. 1923, pp. 150–157 and (discussion) 157–160. Discusses possibilities of bettering relationship between purchasing agent and engineer.

Sales and Production, Tie-up of. The Tie-up of Sales and Production. L. J. Conger. Taylor Soc.—Bul., vol. 8, no. 4, Aug. 1923, pp. 137–140. Discusses three problems of proper coördination and tie-up between sales and production; (1) Satisfactory and scientific budgeting of sales possibilities; (2) efficient and workable budgeting of production; (3) proper control of balance between sales and production budgets.

Task Setting. Two Practical Cases of Task-Setting. Charles N. Underwood. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 341–346. Formulas used for punching and button sewing.

Time Study. See TIME STUDY.

INDUSTRIAL ORGANIZATION

Military Type. The Military Type of Organization. W. Maxwell Reed. Taylor Soc.—Bull., vol. 8, no. 4, Aug. 1923, pp. 141–149. Procedure for enhancing its value.

Theory of. Theory and Technical Side of Organization (Théorie et technique élémentaires d'organisation). J. Cabanel. Revue Générale de l'Electricité, vol. 13, nos. 25 and 26, June 23 and 30, 1923, pp.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.)
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthingotn Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co.

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Shepard Elect. Crane & Hoist Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Motors, Synchronous
Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
* Linde Air Products Co.

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.)
* Crane Co.
Lunkenheimer Co.

Oil and Grease Guns
* Royersford Fdry. & Mach. Co.

Oil Burning Equipment
* Best, W. N. Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Improved Equipment Co.
Morse Dry Dock & Repair Co.
(Fuel Oil Engrg. Co.)
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.)

Oil Well Machinery
* Brownell Co.
* Ingersoll-Rand Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Oiling Devices
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Oiling Systems
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Oils, Fuel
Texas Co.

Oils, Lubricating
Texas Co.
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Ovens, Core
* Whiting Corporation

Oxy-Acetylene Supplies
* Linde Air Products Co.

Oxygen Gas
* Linde Air Products Co.

Packing, Ammonia
France Packing Co.
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Packing, Asbestos
* Goodrich, B. F. Rubber Co.
Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
* Goodrich, B. F. Rubber Co.
Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
Johns-Manville (Inc.)
Steel Mill Packing Co.
* United States Rubber Co.

Packing Rubber
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
Johns-Manville (Inc.)
* United States Rubber Co.

Packing Sheet
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
Johns-Manville (Inc.)
Steel Mill Packing Co.
* United States Rubber Co.

Paints, Concrete (For Industrial Purposes)
Smooth-On Mfg. Co.

Paint, Metal
* Dixon, Joseph Crucible Co.
* General Electric Co.
Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Paper, Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
DuPont Engineering Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
* Dixon, Joseph Crucible Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Penstocks
Smith, S. Morgan Co.

Petroleum Products
Texas Co.

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* U. S. Cast Iron Pipe & Fdry. Co.

Pipe, Riveted
* American Spiral Pipe Wks.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe, Welded
* American Spiral Pipe Wks.
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
* Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
* Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Pipe Threading Machines
Treadwell Engineering Co.

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Plate Metal Work
(See Steel Plate Construction)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Morse Chain Co.
* Poole Engrg. & Mach. Co.
* Royersford Fdry. & Mach. Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
Philadelphia Drying Mchry. Co.

Presses, Draw
* Niagara Machine & Tool Works

Presses, Foot
* Royersford Fdry. & Mach. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Mchry. Co.

Presses, Punching and Trimming
Long & Allstatter Co.
* Niagara Machine & Tool Works
* Royersford Fdry. & Mach. Co.

Presses, Sheet Metal Working
* Niagara Machine & Tool Works

Presses, Toggle
* Niagara Machine & Tool Works

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Mchry. Corp'n

Propellers
* Morris Machine Works

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Iron
* Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
* Kenworthy, Chas. F. (Inc.)

Pulverizers
* Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc., Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Outfits
Midwest Engine Corp'n

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
Taber Pump Co.
* Titusville Iron Works Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.

1059–1067 and 1103–1106, 12 figs. Objects and purpose of organization; Taylor system of scientific management; elementary theory of human work; cost and sale price; methods for quantity production; calculation of labor and machines required; etc.

INDUSTRIAL PLANTS

Equipment, Selection of. The Selection of Modern Plant Equipment, Paul M. Atkins. Indus. Management (N. Y.). vol. 66, no. 3, Sept. 1923, pp. 176–179. Factors of importance that are often overlooked.

INDUSTRIAL RELATIONS

National Policy. An Engineering Statement of Economic Principles, W. R. Ingalls. Min. & Metallurgy, vol. 4, no. 200, Aug. 1923, pp. 395–398. Labor and distribution of wages; duties and privileges of management; artificial restriction of production; legislation's influence on labor.

INSPECTION

Industrial. Industrial Inspection. Int. Labour Rev., vol. 8, no. 2, Aug. 1923, pp. 279–284. Labor inspection in Belgium in 1921; factory inspection in South Africa in 1921.

INSULATORS, HEAT

Bagasse Lumber. Insulating Lumber from Sugar Mill Bagasse, Alan G. Wikoff. Chem. & Met. Eng., vol. 29, no. 9, Aug. 27, 1923, pp. 360–362, 6 figs. Insulating lumber of great commercial value has been developed from extracted sugar-cane fiber, now used only as fuel in order to get rid of it.

Balsam-Wool. Balsam-Wool, Howard F. Weiss. Chem. & Met. Eng., vol. 29, no. 12, Sept. 17, 1923, pp. 534–536, 4 figs. New heat insulator developed by disintegrating waste wood and rearranging fibers so as to obtain maximum of dead air cells; material has lower thermal conductivity than balsa, lightest natural wood.

Slag Wool. Designing and Operating a Slag Wool Plant, Herbert Lang. Chem. & Met. Eng., vol. 29, no. 9, Aug. 27, 1923, pp. 365–367, 1 fig. Discusses manufacture of insulating and filtering material from smelter slag.

INTERNAL-COMBUSTION ENGINES

Exhausting into Low-Pressure Turbines. Internal-Combustion Engines Exhausting into Low-Pressure Turbines, F. Modugno. Shipbldg. & Ship. Rec., vol. 22, no. 10, Sept. 6, 1923, pp. 295–296, 2 figs. Deals with compound expansion and particularly with that obtained by utilizing in low-pressure turbines the exhaust gases from cylinders. (Abstract.) Paper read before Instn. Nav. Architects.

Power Determination. Exact Determination of the Power of Explosive Engines (Détermination précise de la puissance des moteurs à explosion), Paul Jouet. Journal de la Marine, vol. 41, no. 2105, July 28, 1923, pp. 349–350, 6 figs. Explains construction of curves showing power, efficiency, speed as function of r.p.m., etc., and use of these curves in management of engines.

Railway Traction, Application to. Application of Internal Combustion Engines to Railway Traction (Application du moteur à hydrocarbures à la traction sur voies ferrées), E. Brillie. Revue Générale des Chemins de Fer, vol. 42, nos. 4 and 5, Apr. and May 1923, pp. 272–305 and 387–414, 130 figs. Use of explosive engines for mines, street cars, railways, etc., their operation and advantages; hydraulic, mechanical, electric, electromechanical, and compressed-air transmissions; etc.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; DIESEL ENGINES; OIL ENGINES; SEMI-DIESEL ENGINES.]

IRON

Electrolytic. Electricity in Metallurgy. Iron Age, vol. 112, no. 12, Sept. 20, 1923, p. 756. Electric blast furnaces; properties, composition and uses of French electrolytic iron. Translated and abstracted from Revue de Metallurgie, July.

Electrolytic, Corrosion of. Corrosion of Electrolytic Iron, W. E. Hughes. Chem. & Met. Eng., vol. 29, no. 12, Sept. 17, 1923, pp. 536–537, 2 figs. Argument for necessity of using pure iron as basis for research experiments.

Production Direct From Ore. Making Iron from Ore by a New Electrolytic Process, E. C. Kreutzberg. Iron Trade Rev., vol. 73, no. 9, Aug. 30, 1923, pp. 595–598, 7 figs. Describes Eustis process, which produces iron averaging over 99.9 per cent pure; results of tests made on iron produced by this method, cost of production, etc.

IRON ALLOYS

Iron-Carbon. Effect of Silicon on Equilibrium Diagram of System Carbon-iron near Eutectoid Points, H. A. Schwartz. Am. Inst. Min. & Met. Engrs.—Trans., no. 1264-S, Aug. 1923, 6 pp., 4 figs. and (abstract) Min. & Metallurgy, vol. 4, no. 200, Aug. 1923, p. 423, 1 fig. Results of studies concerning effect of silicon on location of eutectoid points.

K

KNITTING MACHINES

Needles, Manufacture of. Latch Needle Manufacture. Machy. (Lond.), vol. 22, no. 568, Aug. 16, 1923, pp. 627–631, 9 figs. Description of methods employed in making knitting-machine needles, and special equipment employed.

L

LABOR

Eight-Hour Law. The Eight-Hour Day in Europe, H. Cole Estep. Iron Trade Rev., vol. 73, no. 8, Aug. 23, 1923, pp. 536–540. Iron and steel plants adopted short day at end of war; no tendency to revert to 12-hour shifts; difficulties with new system not easily overcome.

Legislation. Recent Labour Legislation. Int. Labour Rev., vol. 8, no. 2, Aug. 1923, pp. 285–305. Bibliography.

Living Wage. What About the Living Wage? Robert J. Anderson. Indus. Management (N. Y.), vol. 66, no. 3, Sept. 1923, pp. 140–143. Author seeks to prove that living wage based upon theoretical budget is unsound; that in large number of cases budgets themselves are nothing more than composite of guesses; that great desideratum is not standard wage but standard of work.

Short Day in Steel Works. Steel Works Experience with the Short Day, Bradley Stoughton. Iron Age, vol. 112, no. 6, Aug. 9, 1923, pp. 325–328. Wage adjustments as worked out at various plants; question of spare-time work under new regime.

LABORATORIES

Foreign. French and Foreign Laboratories (Les Laboratoires Français et les Laboratoires Étrangers) L'Industrie Électrique, vol. 32, no. 745, July 10, 1923, pp. 247–252. Inefficiency of industrial and research laboratories in France; cites numerous American examples in justification, covering most important industries.

LATHES

Design. Some Details of Lathe Design, Albert Clegg. Am. Mach., vol. 59, no. 11, Sept. 13, 1923, pp. 409–412, 6 figs. Push pin lock for heavy machinery; double back gears; cone clutches applied to feed-starting devices; reducing friction in powerful clutch.

Dividing Appliance. A Worm and Plate Dividing Appliance. Model Engr. & Electrician, vol. 49, no. 1164, Aug. 16, 1923, pp. 171–172, 2 figs. Attachment is suitable for private worker and can be used on practically any lathe which is not equipped with a cluster gear.

Engine. New Engine Lathe. Iron Age, vol. 112, no. 9, Aug. 30, 1923, pp. 546–547, 2 figs. Describes 16-in. lathe designated as model B placed on market by Pratt & Whitney Co., Hartford, Conn., primarily designed for individual motor drive, using a geared head, and may be adapted readily to single pulley drive or a cone head with countershaft drive.

Precision. The Le Blond 15-Inch Precision Tool Room Lathe. West. Machy. World, vol. 14, no. 8, Aug. 1923, pp. 272–274, 3 figs. Special features of lathe which is said to represent highest development in lathes for toolroom work.

LIGHTING

Industrial Regulations. Industrial Lighting Regulations, G. H. Stickney. Indus. Engr., vol. 81, no. 9, Sept. 1923, pp. 447–451 and 469–470, 1 fig., 4 tables. Summary of regulations included in existing codes, together with present tendencies toward future legislation.

LOCOMOTIVES

By-Pass Valves. By-Pass Valves for Steam Locomotives (Druckausgleicher für Dampflokomotiven), O. Günther. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 34, Aug. 25, 1923, pp. 836–837, 11 figs. Describes automatic plate valve for large and small cylinders in connection with a release valve for sudden equalization of pressure, which at same time serves as starting device for compound locomotives.

Electric. See ELECTRIC LOCOMOTIVES.

4-8-0 and 4-6-0 Types. New Locomotives for Colonial Railways. Ry. Gaz., vol. 39, no. 7, Aug. 17, 1923, pp. 222–224, 6 figs. Details of locomotives recently built by Vulcan Foundry Ltd., for Uganda, Nigerian and Ceylon Government Railways, two having 4-8-0 wheel arrangement, and other, viz., that for Ceylon Government Railway, being of 4-6-0 type.

Frames. Tests on Different Shaped Arch Bar Side Frames, Louis E. Endsley. Ry. Age, vol. 75, no. 9, Sept. 1, 1923, pp. 377–378, 3 figs. Slight changes in design reduce unit stresses from over 40,000 lb. to about 20,000 lb.

France. Locomotive Practice and Performance in France, J. T. Burton-Alexander. Engineer, vol. 136, nos. 3527, 3528 and 3529, Aug. 3, 10 and 17, 1923, pp. 119–120, 143–145 and 178–179. Account of various trips made by author on footplates of engines and in train itself on Midi; Paris-Orleans; Paris, Lyon and Mediterranean; and Northern of France railways.

Great Western Ry. G. W. R. Four-Cylinder Locomotive, Caerphilly Castle. Engineer, vol. 136, no. 3530, Aug. 24, 1923, p. 197, 4 figs. partly on p. 202. Main particulars of first of ten new locomotives for Great Western Ry.; 2312 sq. ft. total heating surface; tractive effort (85 per cent boiler pressure), 31,626 lb. See also Ry. Gaz., vol. 39, no. 8, Aug. 24, 1923, pp. 252–253, 3 figs.

Superheater. Pacific Type Superheated Locomotive of the Orleans Company (Locomotive "Pacific" à surchauffe de la compagnie d'Orléans), M. Lunier. Revue Générale des Chemins de Fer, vol. 42, no. 6, June 1923, pp. 15–22, 14 figs. partly on supp. plates. Details of design, equipment and operation; simple expansion; table of principal data.

Tank. Six-coupled Tank Locomotives for India. Engineer, vol. 136, no. 3529, Aug. 17, 1923, pp. 172–173, 5 figs. Particulars of locomotives built for Bombay, Baroda and Central India Ry.; Belpaire boiler with copper firebox, having 1195 sq. ft. total heating surface, without superheater, grate area of 27 sq. ft., and fitted with Marine and Locomotive Superheaters, Ltd., superheater, with 21 elements, adding a further 260 sq. ft. heating surface.

Tank Engines of the Paris-Orleans Railway. Engineer, vol. 136, no. 3531, Aug. 31, 1923, p. 236, 2 figs. Details of eight-coupled engines.

LUBRICATING OILS

Chemical Composition and Tests. Some Notes on Lubrication, W. St. J's-Findlay. Indus. Management (Lond.), vol. 10, no. 3, Aug. 9, 1923, pp. 65–66, 2 figs. States that lubrication, a factor of great importance in engine and machine efficiency, is not receiving attention by engineers that it demands. Describes chemical composition of the various oils used, and tests to which they are subjected.

LUBRICATION

Problems. Lubrication Problems and Their Correction, Allen F. Brewer. Indus. Management (N. Y.), vol. 66, no. 3, Sept. 1923, pp. 134–139, 7 figs. What lubricant to use, where, and why.

LUMBER

Standard Abbreviations. Standard Abbreviations of Terms Used in Lumber Industry. Eng. & Contracting (Buildings), vol. 60, no. 1, July 25, 1923, pp. 182–183. Recommended by Forest Products Laboratory of U. S. Forest Service.

M

MACHINE CONSTRUCTION

Ceramic Materials Substituted for Metals. Ceramic Materials (Keramische Massen als Werkstoffe), Felix Singer. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 24, June 16, 1923, pp. 584–586. Replacing metals by ceramic materials in machine construction; compares properties of ceramic materials and metals; suggestions for advantageous application of ceramic materials in construction of apparatus.

MACHINE SHOPS

Heavy Work. Production Methods on Heavy Work. Eng. Production, vol. 6, no. 131, Aug. 1923, pp. 357–360, 12 figs. Describes procedure in Allis-Chalmers Mfg. Co.'s works, Milwaukee, Wis., in production of heavy units, such as large turbine plants, gas engines, etc.

Planning in. The Profit of Planning. Engineering, vol. 116, no. 3007, Aug. 17, 1923, pp. 198–199, 1 fig. Losses in course of manufacture, some unavoidable or too costly to avoid and others avoidable by better planning and organization; emphasizes latter and shows how efficiency can be increased.

MACHINE TOOLS

Motors for, High-Speed. High-speed Motors for Machine Tools, W. A. Furst. Machy. (N. Y.), vol. 30, no. 1, Sept. 1923, pp. 41–43, 3 figs. Factors that determine motor speed; voltage required at different speeds; method of obtaining high-frequency current; kilowatt output; obtaining two different frequencies; automatic control of motors.

Railway Wheel Production. Machine Tools for Railway Wheel Production. Machy. (Lond.), vol. 22, nos. 560 and 568, June 21 and Aug. 16, 1923, pp. 357–361 and 621–626, 12 figs. Consideration of machine tools of latest type that have been developed by representative machine tool makers for dealing with railway wheel production.

Running-in Tests for. Running-in Tests for Machine Tool Units, Douglas T. Hamilton. Machy. (N. Y.), vol. 30, no. 1, Sept. 1923, pp. 47–48, 3 figs. Fellows Gear Shaper Co., Springfield, Vt., adheres to practice of giving machine a thorough running test before it is shipped; describes unit assembly and final assembly tests made of recently developed high-speed shaper.

Setting Devices. Special Setting Devices Effect Time Savings, Fred Horner. Can. Machy., vol. 30, no. 7, Aug. 16, 1923, pp. 18–19, 8 figs. Description of several unusual methods of increasing economy and accuracy in adjustment and setting of machine tools in Canadian shops.

Speeds and Feeds. Speeds and Feeds of Machine Tools (Les vitesses de coupe économiques des outils et les temps d'usinage), Armand Bussod. Génie Civil, vol. 83, no. 3, July 21, 1923, pp. 58–63, 7 figs. Develops curves with speeds as abscissas and feeds as ordinates; graphic determination of economic cutting of metals and of most economic speeds.

Typewriter Manufacture. Special Machines in a Typewriter Plant, Carl Gabrielson. Machy. (N. Y.), vol. 30, no. 1, Sept. 1923, pp. 1–5, 10 figs. Describes a number of mechanisms employed in single-purpose machines developed in engineering department of L. C. Smith & Bros. Typewriter Co., Syracuse, N. Y., for operations on typewriter parts.

MACHINERY

Characteristics at High Altitudes. Variations in Characteristics of Machinery at Great Altitudes (Las Variacions de las Caracteristicas en las Máquinas a gran Altura), Antonio Pauly. Asociación Argentina de Electrotécnicos—Boletin, vol. 9, no. 3-4, Mar.-Apr. 1923, pp. 41–44. Gives experience in operating machinery three to five thousand m. above sea level, or at barometric pressure of 535 to

Manufactured by Advertisers **CLASSIFIED LIST OF MECHANICAL EQUIPMENT** **Alphabetical List on page 138**

Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
Midwest Engine Corp'n
* Morris Machine Works
* Nordberg Mfg. Co.
Taber Pump Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Deep Well, Axial
Midwest Engine Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Nordberg Mfg. Co.
Taber Pump Co.
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
Midwest Engine Corp'n
* Worthington Pump & Machinery Corp'n

Pumps, Filter Press
Buffalo Steam Pump Co.
* Goulds Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.
Taber Pump Co.

Pumps, Hydraulic
* American Fluid Motors Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Measuring
Wayne Tank & Pump Co.

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.)

Pumps, Oil
* Bowser, S. F. & Co. (Inc.)
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lunkenheimer Co.
Midwest Engine Corp'n
Taber Pump Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.)
* Goulds Mfg. Co.
Lunkenheimer Co.

Pumps, Oil (Hand)
* Bowser, S. F. & Co. (Inc.)
* Goulds Mfg. Co.
Lunkenheimer Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
* Morris Machine Works
* Smidth, F. L. & Co.
Taber Pump Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Midwest Engine Corp'n
Taber Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Midwest Engine Corp'n
* Morris Machine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Croll-Reynolds Engrg. Co. (Inc.)
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Punches, Metal Hand (Power)
* Parker-Kalon Corp'n

Punches, Multiple
* Long & Allstatter Co.
Mackintosh-Hemphill Co.

Punches, Power
* Niagara Machine & Tool Works
* Royersford Fdry. & Mach. Co.

Punches and Dies
* Royersford Fdry. & Mach. Co.

Punching and Coping Machines
* Long & Allstatter Co.

Punching and Shearing Machines
* Long & Allstatter Co.
* Royersford Fdry. & Mach. Co.

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.)
Elliott Co.

Purifying and Softening Systems, Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Superheater Co.
* Taylor Instrument Cos.

Pyrometers, Optical
* Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co.

Pyrometers, Radiation
* Taylor Instrument Cos.

Racks, Machine, Cut
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Railways, Industrial
Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recorders, CO
* Uehling Instrument Co.

Recorders, CO_2
* Uehling Instrument Co.

Recorders, SO_2
* Uehling Instrument Co.

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
Johns-Manville (Inc.)
* Nordberg Mfg. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Blower
* Davis, G. M. Regulator Co.

Regulators, Damper
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Parker-Kalon Corp'n

Regulators, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Feed Water
* Edward Valve & Mfg. Co.
Elliott Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Humidity
* Fulton Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Fulton Co.
* General Electric Co.
* Kieley & Mueller (Inc.)
* Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Powers Regulator Co.
* Sarco Co. (Inc.)
* Taylor Instrument Cos.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
* Long & Allstatter Co.

Roller Bearings
(See Bearings, Roller)

Rolling Mill Machinery
Mackintosh-Hemphill Co.
Treadwell Engineering Co.

Rolls, Bending
* Niagara Machine & Tool Works

Rolls, Crushing
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Rolls, Rubber
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Rolls, Steel
Mackintosh-Hemphill Co.

Roofing
Johns-Manville (Inc.)
Texas Co.

Roofing, Asbestos
Johns-Manville (Inc.)

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope Drives
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rubber Goods, Mechanical
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* United States Rubber Co.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
* Smidth, F. L. & Co.

Screens, Shaking
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Water Intake (Traveling)
Chain Belt Co.
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Drive (Hardened)
* Parker-Kalon Corp'n

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Self-Tapping (Hardened)
* Parker-Kalon Corp'n

Screws, Set
Allen Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Steam
* Crane Co.
Elliott Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Shafting
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
Cumberland Steel Co.
* Falls Clutch & Mchry. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

425 mm. hg., including steam engines, hydraulic turbines, internal-combustion engines, electric machinery, etc.

Rating of. Rating of Machinery, E. W. Pierce. Indus. Management (Lond.), vol. 9, nos. 10, 11 and vol. 10, no. 3, May 17, 31 and Aug. 23, 1923, pp. 304–306, 334–336 and 95–97. Law in Scotland and Ireland; history of Bill; question of ratable value. From paper read before Liverpool Eng. Soc.

MALLEABLE CASTINGS

Manufacture. Making Malleable Castings. Eng. Production, vol. 6, no. 132, Sept. 1923, pp. 401–406, 16 figs. Works and methods of Ley's Malleable Castings Co., Derby, England, said to be largest foundry in Europe exclusively devoted to this class of work.

MALLEABLE IRON

Melting. Melting Small Malleable Heats, S. J. Felton. Foundry, vol. 51, no. 16, Aug. 15, 1923, pp. 671–672. Malleable iron made in arc-electric furnace gives trouble in annealing; cost of producing small quantities high and expert knowledge required to keep out of trouble. Paper presented before Am. Foundrymen's Assn.

METAL SPRAYING

Schoop Process. Schoop Metal Spraying Processes and Their Recent Progress (Quelques observations sur les procédés de métallisation Schoop et sur les progrès récents de ces procédés), J. Guilbert. Revue de Métallurgie, vol. 20, no. 6, June 1923, pp. 352–357. Explains process and its mechanism; formation of alloys and heat treatment; etc.

METALS

Conductivity. Effect of Pressure on Thermal and Electric Conductivity of Metals and the Wiedemann-Franz Law (Influenza della pressione sulla conducibilita calorifica ed elettrica dei metalli e la legge di Wiedemann-Franz), Silvio Lussana. Nuovo Cimento, vol. 25, no. 3–4, Mar.–Apr. 1923, pp. 115–130. Results of Bridgman's experiments on effect of pressure on thermal conductivity of metals, differing from those of author, and justifies author's results.

Critical Points. Methods and Apparatus for Determining Critical Points of Metals and Alloys (Methodes et appareils utilises pour la détermination des points critiques des métaux et alliages), Pierre Dejean. Chimie & Industrie, vol. 9, nos. 4 and 5, Apr. and May, 1923, pp. 654–664 and 888–899, 48 figs. Discusses specific heats, expansion, magnetic and mechanical properties; classification and description of recording apparatus.

Extrusion, Effect on. Effect of Extrusion on the Resistance of Metals and Alloys (Influence de l'ecrouissage sur la resistivité des métaux et des alliages), Léon Guillet and Marcel Ballay. Académie des Sciences—Comptes Rendus des Séances, vol. 176, no. 25, June 18, 1923, pp. 1800–1802. Results of tests of pure metals previously annealed by new method recording variation of resistance as a function of annealing temperature.

Formed and Drawn Parts. Selecting Material for Formed and Drawn Parts, L. N. Brown. Am. Inst. Min. & Met. Engrs.—Trans., no. 1257-S, Aug. 1923, 10 pp., 16 figs. and (abstract) Min. & Metallurgy, vol. 4, no. 200, Aug. 1923, pp. 418–419. Method suggested of testing sheets and strips to show suitability for formed or drawn parts, consists of using a so-called ductility machine with pressure-gage attachment, and from reading, developing a "hardness factor" and depth at breaking point.

Heat Treatment. New Device for Heat Treating Metals. Elec. Ry. Jl., vol. 62, no. 7, Aug. 18, 1923, pp. 265–266, 2 figs. Greater speed in process and a more uniform product are advantages claimed for new electrical method.

Stainless. The "Stainless" Metals of Commerce, J. Kent Smith. Iron Age, vol. 112, no. 10, Sept. 6, 1923, pp. 615 and 650–651. Discussion of their properties and heat treatment; large possibilities in iron-chrome complex; place of non-ferrous alloys.

X-Ray Examination. X-Ray Examination of Irregular Metal Objects, Ancel St. John. Am. Inst. Min. & Met. Engrs.—Trans., no. 1263-S, Aug. 1923, 11 pp., 15 figs. and (abstract) Min. & Metallurgy, vol. 4, no. 200, Aug. 1923, p. 417, 1 fig. Describes new method of mounting objects for X-ray examination; typical defects observed in metals are illustrated and examples of possibilities of method are given; method is rapid, inexpensive, and can be used on a commercial scale.

MOLDING METHODS

Plate Molding. Plate Moulding, W. H. Cook. Foundry Trade Jl., vol. 28, no. 364, Aug. 9, 1923, pp. 110–112, 5 figs. Determination of size of box; construction of pattern; method of working; preparation of patterns; match plates.

MONEL METAL

Properties. Monel Metal for High Temperature Work. Mar. Engr. & Naval Architect, vol. 46, no. 551, Aug. 1923, p. 303, 2 figs. Résumé of its properties.

MOTOR BUSES

Design. What Is the Ideal in Motor Bus Design? R. A. Whittingham. Automotive Industries, vol. 49, no. 10, Sept. 6, 1923, pp. 487–489, 1 fig. Author thinks trolley cars offer many ideas for adaptation, particularly as regards bodies.

Yellow Coach Co. Yellow Coach Has New Bus Chassis with Single or Two-Deck Bodies, J. Edward Schipper. Automotive Industries, vol. 49, no. 7, Aug. 16, 1923, pp. 314–320, 14 figs. To be built for Chicago Coach Co. and also for general market; important features are 4-wheel brakes, 4-by-6-in. Knight engine, 3-speed chain or 4-speed gear-type gearset, underslung worm axle, progressive springs with rubber shock insulators.

MOTOR-TRUCK TRANSPORTATION

Development in France. Development of Automobile Transport (Le développement des Transports Automobiles), H. Marschal and F. Bordas. Industrie des Tramways, vol. 17, no. 199, July 1923, pp. 249–255. Automobile traffic in France between 1900 and 1921; effect on economic life; desiderata for improvement of track; net costs of transportation.

MOTOR TRUCKS

Carburetor Adjustment. Gasoline Saved on Government Trucks by Adjusting Carburetors by Exhaust Gas Analysis, G. W. Jones and A. C. Fieldner. U. S. Bur. of Mines, Reports of Investigations, no. 2487, June 1923, 13 pp., 3 figs. Tests made at Government Fuel Yard at Washington to improve adjustment of carburetors on trucks used for transporting coal from Fuel Yard to government buildings in Washington.

Low-Loading. The Coming of the Motor Float. Motor Transport (Lond.), vol. 37, no. 962, Aug. 6, 1923, pp. 173–174, 3 figs. Details of specially designed 30-cwt. French chassis.

Manufacturing Plants. Building Motor Trucks in a Southern California Shop, Fred H. Colvin. Am. Mach., vol. 59, no. 8, Aug. 23, 1923, pp. 293–295, 7 figs. Shops of Moreland Truck Co. at Burbank, Cal.; machinery and methods.

Municipal Multi-Purpose. A Multi-Purpose Municipal Saurer. Motor Transport (Lond.), vol. 37, no. 962, Aug. 6, 1923, pp. 169–171, 15 figs. Tank car that can be used for street cleaning and fire fighting and is convertible to three-way tipping lorry.

N

NICKEL

Uses. Outlets of Nickel in Industry, Thomas W. Gibson. Eng. & Min. Jl.-Press, vol. 116, no. 9, Sept. 1, 1923, pp. 364–366. Nickel-steel and other alloys find wide application where a quality product is desired; protective properties of nickel; nickel strengthens steel; impurities in nickel.

NICKEL STEEL

Production Direct from Ore. Nickel Steel Direct from the Ore, F. H. Mason. Iron Age, vol. 112, no. 12, Sept. 20, 1923, pp. 753–754. Use of Canadian and Cuban ores; waste involved; presence of copper; use of electric furnace.

O

OFFICE BUILDINGS

Maintenance. Industrial Office Building Maintenance, Wallace Clark. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 347–352, 9 figs. Planning, scheduling, inspection and repairs.

OIL ENGINES

Airless-Injection. Trials of the New Hesselman Engine (Versuche mit dem neuen Hesselman-Motor) E. Hubendick. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 32, Aug. 11, 1923, pp. 783–785, 11 figs. Combustion tests have shown thermal efficiency of 35.7 per cent. The highest useful average pressure was 7.24 atmos.; fuel consumption at normal load is 175.2 g. per hp. (Translated from Teknisk Tidskrift, Apr. 1922.)

Construction. Suggestions for Production in Quantities of Small and Medium-Size Oil Engines (Richtlinien fur den Reihenbau von kleinen und mittleren Oelmotoren), F. Schultz. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 32, Aug. 11, 1923, pp. 773–777, 13 figs. Advantages of quantity production, smaller cost and greater yield; better training of workers, development of types of engines, standardization of parts, erection of engines from parts in stock.

Crude-Oil. The Crude Oil Engine, M. Johnstone-Taylar, Gas & Oil Power, vol. 18, no. 215, Aug. 2, 1923, pp. 184–186, 3 figs. Development of present designs; two- and four-stroke convertible gas and oil engines.

Experiments. Some Oil Engine Experiments, A. I. Nicholson. Mar. Engr. & Naval Architect, vol. 46, no. 551, Aug. 1923, pp. 295–300, 10 figs. Résumé of experiments carried out on a Scott-Still, a combined oil and steam engine, to clear certain details met with in oil engine design. Abstract of paper read before Instn. Engrs. & Shipbldrs. in Scotland.

Hot-Bulb. Hot-Bulb Engines of the German General Electric Co. (Die Glühkopfmaschine der Allgemeinen Elektricitäts-Gesellschaft), Fr. Sass. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 34, Aug. 25, 1923, pp. 832–835, 19 figs. Structural details and working of engine; temperature measurements on hot bulb show that no gasification of injected fuel can take place before combustion, because the temperatures are too low; fuel must ignite in liquid state.

Indicator Diagrams. Oil Engine Operation Studied by Special Cards, H. F. Birnie. Power Plant Eng., vol. 27, no. 17, Sept. 1, 1923, pp. 880–882, 20 figs. How compression, expansion, exhaust and intake strokes may be studied to advantage by use of offset and weak spring diagrams.

OIL FUEL

Heating Plants, Use in. Burning Liquid Fuel in Small Heating Plants, Walter J. Ottinger. Heating & Vent. Mag., vol. 20, no. 8, Aug. 1923, pp. 44–47, 3 figs. Study of various methods now in use, with chart for determining efficiency of any oil burner and furnace.

Meters for. The Metering of Oil. Power Engr., vol. 18, no. 209, Aug. 1923, pp. 296–297, 2 figs. Describes new Kennedy oil meter.

Production from Coal. Remarkable Strides Made in Production of Liquid Fuels from Coal, Automotive Industries, vol. 49, no. 9, Aug. 30, 1923, pp. 432–435. Greatest development has come through low-temperature system of distillation; other methods. Relation between phenols and aromatic hydrocarbons; experimental work and results.

Viscosity. Fuel Oil and Viscosity, M. G. Langham. Power, vol. 58, no. 11, Sept. 11, 1923, pp. 423–424, 1 fig. Points out that viscosity of oil has much to do with size of lines, pumps, heaters and capacity of burners.

OPEN-HEARTH FURNACES

Heat Consumption. Calculation of the Heat Consumption of Open-Hearth Furnaces (Die Berechnung des Wärmebedarfs der Siemens-Martin-Oefen), Hugo Bansen. Stahl u. Eisen, vol. 43, no. 32, Aug. 9, 1923, pp. 1031–1039, 4 figs. Heat-circulation balance; heat losses; calculation of heat consumption and obtainable gas and air preheating; furnace efficiency; method of heat transmission.

OXY-ACETYLENE CUTTING

Steel. Economies of Oxy-Acetylene Cutting of Steel. Can. Machy., vol. 30, no. 7, Aug. 16, 1923, pp. 24–25. Abstract of report by Int. Acetylene Assn. on correct procedure for cutting forgings to finished shape by means of blowpipe. Savings of time and money effected.

OXY-ACETYLENE WELDING

Boiler Shop. Welding and Cutting Practice in the Boiler Shop. Boiler Maker, vol. 23, no. 8, Aug. 1923, pp. 217–219, 12 figs. Deals with number of jobs, both welding and cutting, in which oxy-acetylene process has been used with high degree of success.

Equipment. Care of Oxy-Acetylene Equipment. Welding Engr., vol. 8, no. 8, Aug. 1923, pp. 28–29. Points to be observed in the handling and use of each unit of the welding outfit.

Iron. Overheating Iron in Autogenous Welding (Ueberhitzung des Eisens bei der autogenen Schweissung), Theo Kautny. Autogene Metallbearbeitung vol. 15, nos. 21, 22 and 23, Nov. 1, 15 and Dec. 1, 1922, and vol. 16, nos. 1, 2 and 4, Jan. 1, 15 and Feb. 15, 1923, pp. 307–309, 317–321, 330–332, 6–8, 20–22 and 40–45, 27 figs. Methods for preventing overheating; microscopic examination of structure which in overheating is sufficiently loosened for oxygen to penetrate; cooling and its effect on structure of iron; annealing; etc.

Oil-Storage Tanks. Flange Welded Tanks. Welding Engr., vol. 8, no. 8, Aug. 1923, pp. 19–20, 3 figs. New type of construction, by which all plates are flanged and welded, cuts down loss of oil through leakage and adds strength to tanks.

P

PAINTS

Structural Materials. Report of Committee D-1 on Preservative Coatings for Structural Materials. Paint Mfrs. Assn. of U. S., Sci. Section, Circular no. 185, July 1923, pp. 309–408, 39 figs. Report of Committee and sub-committees of Am. Soc. for Testing Mtls. Testing of paint vehicles, methods of analysis of paint materials, varnish, shellac, preparation of iron and steel surfaces for painting, physical properties of paints, and anti-fouling paints among subjects treated. See also Am. Soc. Testing Matls.—advance paper, no. 48, for meeting June 25–29, 60 pp., 16 figs.

PIPE, CAST-IRON

Centrifugal Casting. Cast Iron Pipe Centrifugally, E. C. Kreutzberg. Foundry, vol. 51, no. 18, Sept. 15, 1923, pp. 727–731, 9 figs. Rotating chill molds used to form bell-and-spigot-type cast-iron pipe; core required only in bell end; use high-silicon mixture and anneal product.

PIPE, STEEL

Testing. New Methods for Mechanical Testing of Steel Pipe (Nouvelles méthodes pour l'essai mécanique des tubes d'acier). Génie Civil, vol. 83, no. 5, Aug. 4, 1923, pp. 107–108, 10 figs. Static traction and dynamic flexure tests, and how to carry them out; notes on other tests.

PISTON RODS

Steam Drop Hammers. Piston Rods for Steam Drop-Hammers, A. A. Blue. Iron Age, vol. 112, no. 7, Aug. 16, 1923, pp. 415–417, 8 figs. Causes of some defective rods; specifications for material suitable for best service; heat treatment a factor.

PLANERS

Plate. Large Plate-Edge Planer With Electrically Operated Holding Device (Grosse Blechkantenhobelmaschine mit elektrisch betätigter Spannvorrichtung), F. Sipmann. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 26, June 30, 1923, pp. 629–630, 6 figs. Describes machine built by Schiess A. G., including new patented electric regulating device for holding plates during operation.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 138

Shafting, Cold Drawn
* Medart Co.

Shafting, Flexible
* Gwilliam Co.

Shafting, Turned and Polished
Cumberland Steel Co.
Link-Belt Co.

Shapes, Brick
* McLeod & Henry Co.

Shapes, Cold Drawn Steel
* Union Drawn Steel Co.

Shears, Alligator
* Long & Allstatter Co.
* Royersford Foundry & Machine Co.

Shears, Hydraulic
Mackintosh-Hemphill Co.

Shears, Plate
* Long & Allstatter Co.
Mackintosh-Hemphill Co.

Shears, Rotary
* Niagara Machine & Tool Works

Sheaves, Rope
* Brown, A. & F. Co.
Clyde Iron Works Sales Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
* Nordberg Mfg. Co.
* Wood's, T. B. Sons Co.

Sheet Metal Work
* Allington & Curtis Mfg. Co.
* Hendrick Mfg. Co.

Sheet Metal Working Machinery
* Niagara Machine & Tool Works

Sheets, Brass
* Scovill Mfg. Co.

Sheets, Bronze
* Hendrick Mfg. Co.

Sheets, Rubber, Hard
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Shelving, Metal
ManufacturingEquip.&Engrg.Co.

Siphons (Steam-Jet)
* Schutte & Koerting Co.

Slide Rules
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Smoke Recorders
* Sarco Co. (Inc.)

Smoke Stacks and Flues
(See Stacks, Steel)

Sockets, Wire Rope
(See Wire Rope Fastenings)

Soot Blowing Systems
Bayer Co.
Diamond Power Specialty Corp'n

Special Machinery
* Brown, A. & F. Co.
* Builders Iron Foundry
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
DuPont Engineering Co.
* Fawcus Machine Co.
* Franklin Machine Co.
Hooven, Owens, Rentschler Co.
Lammert & Mann Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
Purvis Machine Co.
* Smidth, F. L. & Co.
* Vilter Mfg. Co.

Speed Reducing Transmissions
* Cleveland Worm & Gear Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Poole Engrg. & Mach. Co.

Spray Cooling Systems
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprinklers, Spray
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

Sprockets
Baldwin Chain & Mfg. Co.
* Fuller-Lehigh Co.
* Gifford-Wood Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works

Stacks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Hendrick Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
* Cole, R. D. Mfg. Co.
Morrison Boiler Co.
* Walsh & Weidner Boiler Co.

Standpipes, Concrete
Heine Chimney Co.

Steam Specialties
* Crane Co.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)

Steel Alloy
Union Drawn Steel Co.

Steel, Bright Finished
Union Drawn Steel Co.

Steel, Cold Drawn
Union Drawn Steel Co.

Steel, Cold Rolled
Cumberland Steel Co.
Union Drawn Steel Co.

Steel, Nickel
Union Drawn Steel Co.

Steel, Open-Hearth
* Falk Corporation
Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Keeler, E. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
* Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Stokers, Chain Grate
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Westinghouse Electric & Mfg. Co.

Stokers, Overfeed
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Stools and Chairs, Metal
ManufacturingEquip.&Engrg.Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)

Strainers, Steam
* Kieley & Mueller (Inc.)

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
Hooven, Owens, Rentschler Co.
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Switches, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Synchronous Converters
(See Converters, Synchronous)

Synchroscopes
Weston Electrical Instrument Co.

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Tachometers
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Tachoscopes
* American Schaeffer & Budenberg Corp'n

Tanks, Acid
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
* Graver Corp'n
* Hendrick Mfg. Co.
Morrison Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
* Combustion Engineering Corp'n
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
Morrison Boiler Co.
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Morrison Boiler Co.
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Machinery
* Franklin Machine Co.

Thermometers
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Taylor Instrument Cos.

Thermometers, Distance
* Taylor Instrument Cos.

Thermometers, High Range (Recording)
* Bailey Meter Co.
* Taylor Instrument Cos.

Thermostats
* Bristol Co.
* Fulton Co.
* General Electric Co.
* Powers Regulator Co.

Thread Cutting Tools
* Crane Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Threading Machines, Pipe
* Landis Machine Co. (Inc.)

Tie Tamping Outfits
* Ingersoll-Rand Co.

Time Recorders
* Bristol Co.

Tinsmiths' Tools and Machines
* Niagara Machine & Tool Works

Tipples, Steel
Link-Belt Co.

Tongs, Crane
* Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Machinists' Small
* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
DuPont Engineering Co.

Torches, Hand
* Best, W. N. Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tractors, Industrial (Storage Battery)
* Yale & Towne Mfg. Co.

Tractors, Turntable
* Whiting Corp'n

Trailers, Industrial
* Yale & Towne Mfg. Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Shepard Elect. Crane & Hoist Co.
* Whiting Corp'n

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
* Whiting Corp'n

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Transmissions, Variable Speed
* American Fluid Motors Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* American Schaeffer & Budenberg Corp'n
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* American Schaeffer & Budenberg Corp'n
* Crane Co.
* Sarco Co. (Inc.)

Treads, Stair (Rubber)
* United States Rubber Co.

Trolleys
* Brown Hoisting Machinery Co.
Reading Chain & Block Corp'n
* Whiting Corp'n

Trucks, Industrial (Storage Battery)
* Yale & Towne Mfg. Co.

Trucks, Trailer
* Yale & Towne Mfg. Co.

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* Casey-Hedges Co.

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* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubing, Rubber
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Tubing, Rubber (Hard)
* Goodrich, B. F. Rubber Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

PROFIT SHARING

Management Sharing and. Will Profit-Sharing Bring Management-Sharing? Joseph Mayer. Management & Administration, vol. 6, no. 3, Sept. 1923, pp. 353-357. Among 15 typical profit-sharing plans adopted since 1919, two have management-sharing features.

PULVERIZED COAL

Advantages and Disadvantages. Status of Pulverized Fuel, L. W. W. Morrow. Elec. World, vol. 82, no. 11, Sept. 15, 1923, pp. 525-532, 10 figs. Decreased losses and greater flexibility in operation are admitted advantages from its utilization; typical installations and trends in development; advantages and disadvantages.

European Development. Pulverized Fuel. Queensland Govt. Min. Jl., vol. 24, no. 278, July 14, 1923, p. 251. Union d'Electricité, at Vitry, Paris, equipped with complete installation of Lopulco system of pulverized fuel. Advantages of system. Other equipment installed.

Explosion Hazard. Explosive Tendencies of Pulverized Coal, Hatland Seymour. Chem. Age (Lond.), vol. 9, no. 215, July 28, 1923, pp. 82-84. Discusses hazards which arise in connection with utilization of pulverized fuel; draws attention to fact that little danger is involved providing that reasonable care is taken to comply with well established precautions.

Problems. Pulverized Coal, Audrey J. Grindle. Fuels & Furnaces, vol. 1, nos. 4 and 5, Aug. and Sept. 1923, pp. 273-275 and 361-362, 364 and 366, Aug.: Fuel values; history of pulverized coal. Sept.: Ash problem; drying and pulverizing coal; cost of preparing; safety of installations.

Pulverizers. A Self-Contained Pulverized Fuel Plant. Power Engr., vol. 18, no. 209, Aug. 1923, pp. 302-305, 4 figs. By means of machine known as Atritor, it is possible to adopt pulverized fuel firing for boiler plants without necessity of elaborate buildings and extensive machinery.

PUMPING ENGINES

British. Some Notes on British Water Works Pumping Engines, F. Johnstone-Taylor. Fire & Water Eng., vol. 74, no. 9, Aug. 29, 1923, pp. 399-400, 2 figs. Types of units built for English and foreign water works; some large installations; China and Argentine engines.

PUMPING PLANTS

Design. Modern Waterworks Pumping Stations, B. Burdick. Can. Engr., vol. 45, no. 9, Aug. 28, 1923, pp. 271-275, 4 figs. General principles outlined; examples of recent construction. Fireproof construction. Paper before Am. Water Works Assn.

Equipment. Determining the Proper Equipment for Pumping Stations, Arthur L. Mullergren. Fire & Water Eng., vol. 74, no. 9, Aug. 29, 1923, pp. 391-392, 401-402, and 408. How to decide upon most serviceable type of pumping engines and methods of drive for them; tendency toward turbine-driven centrifugal pump; economy of electric drive.

PUMPS

Air-Lift. The Air Lift Pump. Practical Engr., vol. 68, nos. 1901 and 1902, Aug. 2 and 9, 1923, pp. 63-65 and 74-76, 11 figs. Notes on modern apparatus which have led to more efficient working. Aug. 2: Advantages of air-lift pumping. Aug. 9: Operation; foot-piece design; booster system.

PUMPS, CENTRIFUGAL

Coal Mines. Revolutionizing Mine Pumping with Automatically Primed, Started and Controlled Centrifugal Pumps, Edgar Gealy. Coal Age, vol. 24, no. 11, Sept. 13, 1923, pp. 392-396, 8 figs. Development of automatic equipment; application of simple devices to complex operations; advantages and economies realized; details of equipment and operation.

Design and Application. The Present Status in the Design of Centrifugal Pumps (Der heutige Stand des Kreiselpumpenbaues), E. Heidebrock. Zeit. des Vereines deutscher Ingenieure, vol. 67, nos. 33 and 34, Aug. 18 and 25, 1923, pp. 797-803 and 826-831, 43 figs. Phenomena of flow in pumps; sources of loss; modern high- and low-pressure pumps; noteworthy examples of pumping plants showing varied useful possibilities of centrifugal pump.

Installation and Operation. Some Notes on Centrifugal Pumps, C. C. Brown. Power Plant Eng., vol. 27, no. 17, Sept. 1, 1923, pp. 867-869, 1 fig. Working data on installation and operation.

Oil Industry. Pumps and Pumping Systems in the Oil Industry. Oil Eng. & Finance, vol. 4, no. 81, July 28, 1923, pp. 59-60, 1 fig. Details of Gwynne's centrifugal or turbine pump.

Steel Plants. Motor Operated Centrifugal Pumps in Steel Plants, B. A. Cornwell. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 309-326, 6 figs. General laws governing actions of centrifugal pumps; performance and operation of typical centrifugal pumps as used in steel plants; cost of pumping water by steam-turbine-driven pump; types of motors for driving centrifugal pumps; influence of variation in frequency.

PYROMETERS

Optical. Disappearance of the Filament and Diffraction Effects in Improved Forms of an Optical Pyrometer, C. O. Fairchild and W. H. Hoover. Optical Soc. of Am.—Jl., vol. 7, no. 7, July 1923, pp. 543-579, 10 figs. Laboratory form of pyrometer is described and two special improved forms of micro-pyrometer are described in principle. New law of diffraction, consistent with theory and experiment, i.e., of light incident on an obstacle in an image plane, only that component is diffracted which represents diffracted rays radiating from edge of aperature. Bibliography.

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RADIATORS

Traps. Performance Data on Nineteen Radiator Traps. Heating & Vent. Mag., vol. 20, no. 8, Aug. 1923, pp. 33-39, 23 figs. Results of recent tests, covering such points as venting of air, drainage of water, trapping of steam, and freedom from noise.

RAILS

Corrugation. Rail Corrugation, Robert B. Holt Tram. & Ry. Jl., vol. 54, no. 10, Aug. 23, 1923, pp. 91-93. Discussion on article by H. M. Dudgeon, Feb. and May 1923 issues of Tram. & Ry. Jl.

Developments. Modern Trackwork and its Importance, Robert Hadfield. Inst. of Transport—Jl., vol. 4, no. 9, July 1923, pp. 329-339 and (discussion), 339-343, 13 figs. Rail failures; steel for rails; metallurgical improvements in rail steel. Review of development of rails.

Street-Railway, Laying of. Laying of Street Railway Rails in Different Types of Road Construction (Pose des rails de Tramways dans les divers revêtements de chaussées), A. Mariage. Industrie des Tramways, vol. 17, no. 199, July 1923, pp. 239-249, 7 figs. Report of inquiry addressed to French street-car lines. Methods of laying; advantages and disadvantages of different types of roadbeds; rail jointing; noise and oscillation and how to lessen them.

RAILWAY CONSTRUCTION

Argentine-Chilean Railway. Building New Argentine-Chilean Transandine Railway, Richard F. Maury. Eng. News-Rec., vol. 91, no. 9, Aug. 30, 1923, pp. 332-336, 7 figs. Details regarding Salta-Chile extension of Argentine State Rys. now under construction, to connect existing railway system with Pacific port of Antofagasta; has American viaducts and equipment; maximum grade 2.5 per cent; uses switchbacks and spirals; summit 14,681 ft.

RAILWAY ELECTRIFICATION

Argentina. Railway Electrification in South America. Electrician, vol. 90, nos. 2348, 2349 and 2351, May 18, 25 and June 8, 1923, pp. 532-533, 567-568 and 618-620, 11 figs. Details regarding inauguration of electric traction on Buenos Aires Western Ry., including power stations, transmission lines, rolling stock, etc.

England. The Electrification of the S. E. and C. Railway. Elec. Rev., vol. 93, no. 2386, Aug. 17, 1923, p. 236, 1 fig. New system on South Eastern and Chatham section of Southern Railway will improve conditions at London terminals and coördinate service.

France. Electrification of the Midi Railway (L'Electrification des chemins de fer du Midi). Génie Civil, vol. 83, no. 8, Aug. 25, 1923, pp. 169-176, 23 figs. General plan; utilization of water power from Pyrenees; hydroelectric plants and their equipment; line equipment, including poles and insulators for 150,000-volt three-phase current.

Partial Electrification of the Orleans Railway (Le programme d'électrification partielle du chemin de fer d'Orleans). Génie Civil, vol. 63, no. 7, Aug. 18, 1923, pp. 157-160, 4 figs. Compares cost of electric and steam traction; details regarding electrification of Paris-Brive-Clermont line, including production and transmission of power, overhead equipment, etc.

Partial Electrification of the Orleans Railway (Electrification partielle de la Compagnie du Chemin de Fer d'Orleans), M. Parodi. Société Francaise des Electriciens—Bul., vol. 3, no. 25, May 1923, pp. 83-164, 44 figs. Comparison of electric and steam traction; electrification work on Paris-Brive-Clermont and St. Sulpice-Gannat lines; 3-phase current at 90,000 to 150,000 volts distributed through substations; 1500-volt d.c. current for overhead contact lines; details of locomotives and rolling stock.

RAILWAY MANAGEMENT

Freight Accounting. Freight Accounting on the North Shore, R. B. MacRae. Elec. Ry. Jl., vol. 62, no. 9, Sept. 1, 1923, pp. 329-332. System of daily freight accounts on Chicago, North Shore & Milwaukee Railroad; by sectionalizing of agents' accounts and proving to a known total a complete daily check is obtained, methods of accumulating totals.

RAILWAY MOTOR CARS

Gasoline. Powerful Gasoline Motor Driven Train. Ry. Age, vol. 75, no. 7, Aug. 18, 1923, pp. 291-292, 6 figs. Sykes Company demonstrates two-car train driven by 245-hp. engine and seating 74 passengers.

RAILWAY OPERATION

Line Capacity, Increasing. How the Capacity of a Line Can Be Increased. Ry. Age, vol. 75, no. 11, Sept. 15, 1923, pp. 463-469. Prize-winning and other papers received in contest, as follows: Enlarge the Congested Places in the Line, L. R. Smith; Uniform Movement Will Increase Capacity, P. H. Pearson; Systematic Study of Limiting Factors Essential, G. D. Brooke; Increase the Car Loading, M. A. Simmer.

Safety. Safety in the Operation of Goods Trains. Ry. Gazette, vol. 39, no. 8, Aug. 24, 1923, pp. 250-251 and 256, 2 figs. Discusses some recent accidents on Indian railways, and urges the need for the general adoption of continuous brakes and improved couplings on freight trains

Statistics. I. C. C. Statistics and Operating Efficiency, J. E. Slater. Ry. Age, vol. 75, no. 10, Sept. 8, 1923, pp. 427-430. Operating statistics reports instituted by Interstate Commerce Commision; suggestions as to proper use of data.

Train Control. Automatic Operation of Points, Mersey Railway. Ry. Gazette, vol. 39, no. 8, Aug. 24, 1923, pp. 255-256, 1 fig. First automatic operation installation in England. By its use and the provision of automatic signals, two signal boxes have been closed.

Automatic Train Control, L. F. Hiward. Southern & Southwestern Ry. Club, vol. 17, no. 3, May 1923, pp. 17-18, 21-22, 25-26, 29-30, 33-34, 37-38, 41-42 and 45-46, 4 figs. Review of development of automatic train control on different railways. Types of automatic valves and application.

Device for Automatic Protection of Trains (Meccanismo di protezione automatica per i treni), Alfredo Bianco fu Giuseppe. Ellettricista, vol. 2 (series 4), no. 10, May 15, 1923, p. 75. Describes system of automatic train control consisting of a bell and a white disk signal in cabin and its operation.

Report on Sprague Automatic Train Control. Ry. Age, vol. 75, no. 9, Sept. 1, 1923, pp. 399-400. Detailed review of sixty-day test; results not conclusive but further experiments encouraged.

Train Despatching. Single-Track Despatching on the Orleans Railway (Le dispatching en voie unique sur le réseau d'Orleans), M. Piarrat. Revue Générale des Chemins de Fer, vol. 42, no. 6, June 1923, pp. 482-489, 4 figs. Describes installation of American system as a test on Montlucon-St. Sulpice line, to give increased circulation of rolling stock and expedite traffic.

RAILWAY SHOPS

Electric, Practices of. N. & W. Electric Shop Practices. Elec. Ry. Jl., vol. 62, no. 7, Aug. 18, 1923, pp. 257-260, 4 figs. Repair work at maintenance shops of electric division at Bluestone Junction on Norfolk & Western; equipment and methods well adapted to minimizing upkeep costs.

RAILWAY STATIONS

Layout, Belgian Practice. Layout of Railway Stations (Considérations économiques et pratiques sur les aménagements des stations), Robert van der Mensbrugghe. Association des Ingénieurs Sortis des Ecoles Spéciales de Gand—Annales, vol. 13, no. 12, 1923, pp. 123-138, 11 figs. on supp. plate. Belgian practice in planning railway stations of different types for handling light and heavy passenger and freight traffic.

RAILWAY TIES

Steel. A New Metal Railway Tie Without Holes (Note sur une nouvelle traverse métallique "sans trou"), Armand Desoer. Revue Universelle des Mines, vol. 17, no. 6, June 15, 1923, pp. 449-558, 4 figs. Design and construction of new type of steel tie which has no holes, the weak point of all metal ties; its advantages; comparative maintenance cost of ties.

RAILWAY TRACK

Elevation. Train Operation Improved by Grade Separation. Ry. Age, vol. 75, no. 10, Sept. 8, 1923, pp. 420-425, 10 figs. Completion of East Orange work gives Delaware, Lackawanna & Western three tracks through suburban territory, improving service, and eliminates grade crossings.

Stresses in. Device for Determining Stresses in Track. Elec. Ry. Jl., vol. 62, no. 8, Aug. 25, 1923, pp. 294-295, 3 figs. Otheograph, device for recording actual pressures due to locomotives; graphic record is made directly by impact of wheels.

Turntables. Friction Drive for Turntable Tractors. Ry. Age, vol. 75, no. 10, Sept. 8, 1923, pp. 443-445, 3 figs. Outfits installed by Great Northern cannot be damaged by careless operation.

RAILWAY YARDS

Flood Lighting. Norfolk & Western Installs Lights in 15 Yards. Ry. Age, vol. 75, no. 7, Aug. 18, 1923, pp. 283-287, 8 figs. System of flood lighting peculiarly suited to requirements of classification yards. See also Ry. Elec. Engr., vol. 14, no. 9, Sept. 1923, pp. 273-278, 8 figs.

Switching Yards. Cost of Operating in Shunting Yards (Die Betriebskosten der Verschiebebahnhöfe), Kümmell. Archiv für Eisenbahnwesen, nos. 1, 2 and 3, Jan.-Feb., Mar.-Apr. and May-June, 1923, pp. 1-35, 269-284 and 411-443, 9 figs. Methods of arriving at costs; gives tables of costs, including wages and salaries, general upkeep, lighting, cleaning, locomotives, trains, etc.; plans of various types of yards; comparison of yard systems.

RAILWAYS

Australia. The North-South Transcontinental Railway of Australia. Ry. Gaz., vol. 39, no. 8, Aug. 24, 1923, pp. 245-249, 1 fig. Review of report issued by Parlimentary Standing Committee on Public Works of Australia. Proposed routes; costs.

Importance to Industrial Centers. Railway Requirements of an Important Industrial Area, J. A. Jenkinson. Inst. of Transport—Jl., vol. 4, no. 9, July 1923, pp. 344-353 and (discussion) 353-356. Transport requirements of an important industrial center from point of view of public and of railway. Permanent way and layout; provision of train services; goods and coal services; operating department.

Rolling Stock, Air Resistance on. Measuring the Air Resistance on Railway Material (Mesure de la résistance de l'air sur le matériel des chemins de fer), Ch. Maurain, A. Toussaint and R. Pris. Académie des Sciences—Comptes Rendus des Séances, vol. 177, no. 5, July 30, 1923, pp. 308-310. Results of tests with models in a wind tunnel, including table of

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 138

Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mach. Co.
* Whiting Corp'n

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* Allis-Chalmers Mfg. Co.
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Midwest Engine Corp'n
Ridgway Dynamo & Engine Co.
* Sturtevant, B. F. Co.
* Terry Steam Turbine Co.
* Westinghouse Electric & Mfg. Co.

Turbo-Pumps
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Midwest Engine Corp'n
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

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Northern Engineering Works
* Whiting Corp'n

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(See Pans, Pumps, Traps, etc., Vacuum)

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* Crane Co.
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coefficients for $k = R/V^2$ for locomotives, tenders, etc., cars, isolated and in combination.

REFRIGERATING PLANTS

Fluid Meters. Reliability of Fluid Meters in Refrigerating Tests, L. S. Morse. Refrig. Eng., vol. 10, no. 1, July 1923, pp. 1–8 and (discussion) 8–13, 5 figs. Author's experience with brine and liquid ammonia meters shows that no reliance can be placed in them.

REFRIGERATION

Methods. Refrigeration: What It Is and How to Use It, Seymour A. Woolner. Chem. & Met. Eng., vol. 29, no. 11, Sept. 10, 1923, pp. 506–511, 7 figs. Theory upon which available systems of natural and mechanical refrigeration operate, with charts and tables which will aid in solution of refrigerating problems.

REGULATORS

Arca. A Universal Regulator. Power Engr., vol. 14, no. 8, Aug. 1923, pp. 294–295, 5 figs. In Arca automatic regulator same controlling mechanism is utilized for very wide variety of purposes; said to give remarkable results in diverse conditions.

RESEARCH

Numerical Data as Aid in. Study of Numerical Data As a Means of Utilizing Experience in Industrial Research (Grösszahl-Forschung, ein neues Mittel zur Verwertung der Erfahrung in Industrie und Industrieforschung), K. Daeves. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 26, June 30, 1923, pp. 643–644, 5 figs. Describes new method of studying masses of numbers, such as statistics, which gives accurate and valuable results without costly experiments, including use of curves of averages, frequencies, etc.

ROLLING MILLS

Bar Mill. Enlarges Rolling Mill Capacity, J. D. Knox. Iron Trade Rev., vol. 73, no. 12, Sept. 20, 1923, pp. 807–811, 7 figs. Completion of new 20-in. mut prefaces other improvements at Dunkirk, N. Y., plant; flexible charging machine; describes installation and contemplated extension.

Cold Strip Rolling. Cold Strip Rolling. W. H. Cleaver. Iron Age, vol. 112, no. 12, Sept. 20, 1923, p. 744. Points regarding process.

Rod Mill. Continental Rod-Mill Practice. Iron & Coal Trades Rev., vol. 107, no. 2894, Aug. 17, 1923, pp. 224–226, 15 figs. Methods and equipment in Continental rod mills. From Revue de Métallurgie.

Trains. Rolling Mill Trains (Les trains machines), E. Ponceletz. Revue de Métallurgie, vol. 20, no. 6, June 1923, pp. 369–380, 21 figs. Process and apparatus for rolling blooms and billets; wire drawing; etc.

S

SAFETY VALVES

Boiler. The How and Why of Safety Valves. Power, vol. 58, no. 10, Sept. 4, 1923, pp. 357–361, 8 figs. General principles underlying operation of different types of pop safety boiler valves; practical features; describes some typical safety valves.

SAND, MOLDING

Composition. Composition of Molding Sand, Henry B. Hanley. Foundry, vol. 51, no. 18, Sept. 15, 1923, pp. 745–747. Typical analyses of molding sands from many sources are presented and conclusions drawn to show effect of bonding elements on life and refractoriness. (Abstract.) Paper presented before Am. Foundrymen's Assn.

Treatment and Properties. Rational and Economic Treatment of Foundry Sands (Traitement Rationnel et Economique des Sables servant au moulage de la Fonte), G. Ecureux. Fonderie Moderne, vol. 17, July 1923, pp. 219–222. Imperfections in castings due to poor quality of sand used; analysis and composition of sands; porosity, refractivity and other properties; fineness; screening; etc.

SCREW MACHINES

Milling and Drilling Attachment. Extending the Scope of the Automatic. Eng. Production, vol. 6, no. 131, Aug. 1923, pp. 346–348, 10 figs. Details of new milling and drilling attachment designed for use on automatic screw machine, which will enable series of holes to be drilled through end of work parallel with spindle, recesses to be end-milled and slots to be cut.

Spindles for. High-Speed Spindles for Screw Machines, Luther D. Burlingame. Machy. (N. Y.), vol. 30, no. 1, Sept. 1923, pp. 29–31, 6 figs. Special high-speed equipment for automatic screw machines, operating on brass, with examples showing production of parts in three seconds or less.

SEAPLANES

Rolls-Royce. The Supermarine "Sea Eagle." Flight, vol. 15, no. 26, June 28, 1923, pp. 351–352, 3 figs. Rolls-Royce "Eagle IX" engine is mounted high in gap between planes, and drives a four-bladed pusher airscrew. Other features of design.

SEMI-DIESEL ENGINES

Cold-Starting Device. Novel Starting Device for Oil Engines. Power Engr., vol. 18, no. 209, Aug. 1923, pp. 301–302, 2 figs. Describes new series of two-stroke semi-Diesel engines, incorporating novel means of cold starting.

SEMI-STEEL

Thermal Treatment. Thermal Treatment of Molded Pieces, Albert Portevin. Iron Age, vol. 112, no. 12, Sept. 20, 1923, pp. 743 and 794. Imperfections in tempering semi-steel; density of metal affected by heat treatment, which may produce porousness. Memorandum presented to Acad. of Sci.

SEPARATORS

Oil. The "Vickeen" Centrifugal Oil Separator. Engineering, vol. 116, no. 3010, Sept. 7, 1923, pp. 309–310, 4 figs. on p. 302. Describes plant of British manufacture with self-contained electric drive.

SPRINGS

Helical. Coupled Oscillations of a Helical Spring, A. Sommerfeld. Optical Soc. of Am.—Jl., vol. 7, no. 7, July 1923, pp. 529–535, 3 figs. Instrument for determination of elastic constants of wire; torsional and bending moments of spiral spring; effects of resonance; effects of coupling.

Leaf. Leaf Springs (Les ressorts à lames). Ouvrier Moderne, vol. 6, no. 5, Aug. 1923, pp. 177–183, 11 figs. Modulus of elasticity, maximum elastic expansion, etc.; describes new method of calculation of suspension springs for automobiles which has given entire satisfaction; formulas and graphs used.

Wire. Designing and Making of Wire Springs, J. H. Sullivan. Iron Age, vol. 112, no. 7, Aug. 16, 1923, pp. 413–414. Operations of coiling and grinding; proper relative dimensions of coils; character of wire best suited for springs.

STANDARDIZATION

Industrial. Standardisation in the Engineering Industry, A. J. Stubbs. Post Office Elec. Engrs.' Jl., vol. 16, part 2, July 1923, pp. 132–141. Discusses standardization of measures, materials and machines.

STEAM

Power and Process Work, Use for. The Combined Use of Steam for Power and Other Purposes, Telford Petrie. Engineer, vol. 136, no. 3531, Aug. 31, 1923, pp. 220–222, 5 figs. Points out that, whatever process pressure may be, it must be wasteful and expensive to draw steam from high-pressure boiler through reducing valves, whereas if steam engine is used in place of reducing valve, definite amount of power is produced from heat which would otherwise only go to superheat low-pressure steam; describes different types of such engines.

Tables, Applications of. Practical Applications of the Steam Tables, W. E. Biggs and W. R. Woolrich. Nat. Engr., vol. 27, no. 9, Sept. 1923, pp. 427–428, 1 fig. Relations of temperature and quantity of heat; definitions of units and applications of steam tables to practical problems.

Tables and Diagrams. Tables and Diagrams for Water Vapor Computed on the Basis of Its Specific Heat, Oscar Knoblauch, E. Raisch, and H. Hausen. Mech. Eng., vol. 45, no. 9, Sept. 1923, pp. 538–540, 3 figs. Investigators claim to have derived an equation for specific heat, of simple character, with pressure and temperature entering as magnitudes of first power only; from this equation they have derived equation of state and for entropy and heat content. Translated from Tabellen und Diagramme für Wasserdampf berechnet aus der spezifischen Wärme, R. Oldenbourg, Publishers, Berlin, 1923, 32 pp.

STEAM-ELECTRIC PLANTS

Belfast, Ireland. Electricity Supply in Belfast. Electn., vol. 91, no. 2361, Aug. 17, 1923, pp. 169–170, 5 figs. New Harbour power station, with present capacity of 24,000 kw., possible capacity of at least 150,000 kw.

Belfast's New Power Station. Elec. Times, vol. 64, no. 1661, Aug. 16, 1923, pp. 155–157, 5 figs. Development of electric supply in Belfast since 1895. Present capacity is 24,000 kw., possible capacity of at least 150,000 kw. Details of station and difficulties encountered in establishing it.

Birmingham, England. Nechells Power Station, R. A. Chattock. Ferro-Concrete, vol. 15, no. 1, July 1923, pp. 6–24, 17 figs. Details of station for ultimate output capacity of 105,000 kw. for city of Birmingham.

Kansas City, Mo. Electrical Features, Northeast Station, Kansas City. Power, vol. 58, no. 9, Aug. 28, 1923, pp. 318–321, 6 figs. Generating unit of 30,000 kw. capacity served by vertical condenser with special facilities for cleaning and efficient combination of circulating pumps; house turbine used for emergency auxiliary drive; new layout of electrical system serving auxiliaries and improved monolithic bus cell structure.

Testing Instruments. Some Instrument Practices of the United Electric Light & Power Company, W. E. Caldwell. Power, vol. 58, no. 8, Aug. 21, 1923, pp. 280–283, 3 figs. Explains how company which operates huge Sherman Creek and Hell Gate Stations in New York City, safeguards accuracy of its fundamental test data; instructions for construction of precision.

STEAM ENGINES

Automatic Stops. General Specifications for Construction and Installation of Automatic Engine Stops. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 355–359. As recommended by Safety Committee.

Standardization of Engine Stops, Walter Greenwood. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 361–368. Arguments in favor of standardization.

STEAM PIPE

Underground Mains. Underground Steam Main Construction, John K. Raymond. Domestic Eng. (Chicago), vol. 104, no. 8, Aug. 25, 1923, pp. 384–386, 5 figs. Installing steam mains in concrete conduits in state institutions in Wisconsin; experiments also with hot-water heating through direct injection of high-pressure steam.

STEAM POWER PLANTS

Exhaust-Steam Utilization. Exhaust Steam Turned to Profit. Power Plant Eng., vol. 27, no. 18, Sept. 15, 1923, pp. 911–917, 7 figs. Economies which may be expected from isolated power plant where there is demand for exhaust steam have been fully realized in newly constructed plant for shoe manufacturing plant in Columbus, Ohio; preliminary results show that cost of additional generating equipment will pay for itself within 2½ years.

Institution Buildings. An Example of Institution Efficiency. Power Engr., vol. 14, no. 8, Aug. 1923, pp. 288–293, 12 figs. Describes power, heating and auxiliary system of North London Poor Law Instn., showing usual sources of thermal inefficiency have been largely obviated and how considerable savings have been made; institution consists of 17 large blocks of buildings, covering area of over 9 acres.

Remodeling. Parke, Davis & Co. Remodel Detroit Power Plant. Power, vol. 58, no. 10, Sept. 4, 1923, pp. 406–412, 8 figs. Remodeling plant while maintaining service; installation of bleeder turbines to coordinate more closely power and heating systems; no exhaust escapes to atmosphere; it is either utilized or condensed so that high economy is secured.

Sugar Refinery. Economical Use of Steam in a Sugar Refinery, C. C. Brown. Power Plant Eng., vol. 27, no. 18, Sept. 15, 1923, pp. 923–927, 5 figs. Points out that for maximum economy in operation heat balance between high- and low-pressure systems must be carefully maintained.

STEAM TRAPS

Testing for Leakage. Testing Steam Traps for Leakage, L. D. Goff. Steam Power, vol. 2, no. 4, May 1923, pp. 7 and 14, 1 fig. Method for testing traps for steam loss, which is quick and approximately correct.

STEAM TURBINES

Aligning Methods. Accurate Methods of Aligning Steam Turbines; Taking the Sag Out of a Tight Line, Edgar G. Barker. Power, vol. 58, no. 10, Sept. 4, 1923, pp. 378–380, 5 figs. Describes method which is quickly and positively applicable at any point in a tight line for producing correct distance for vertical measurements of alignment.

Critical Speed. First Critical Speed of Combined Steam-turbine Set, W. R. Needham. Mech. World, vol. 74, nos. 1909 and 1910, Aug. 3 and 10, 1923, pp. 65–66 and 81–82, 19 figs. Deals with multiple-support systems.

STEEL

Chrome-Nickel. See CHROME-NICKEL STEEL.

Cold-Drawn. Effect of Low-Temperature Annealing on Some Mechanical Properties of Cold-Drawn Steels, S. H. Rees. Iron & Steel Inst.—Advance Paper, no. 12, for Meeting Sept. 1923, 11 pp., 8 figs. Shows effect of cold drawing without subsequent annealing in case of mild and of high-carbon steel.

Corrosion. The Effect of Velocity on the Corrosion of Steel in Sulfuric Acid, W. G. Whitman, R. P. Russell, C. M. Welling, and J. D. Cochrane, Jr. Mass. Inst. Technology—Bul., vol. 59, no. 34, July 1923, 12 pp., 4 figs. Describes apparatus and methods employed in recent investigation; results.

The Influence of Nickel and Chromium upon the Solubility of Steel (in Relation to Corrosion), W. H. Hatfield. Iron & Steel Inst.—Advance Paper, no. 8, for Meeting Sept. 1923, 14 pp., 5 figs. partly on supp. plate. Discusses series of experiments designed to give information upon effect of alloying separately, and together, elements chromium and nickel with iron, carbon content being varied, and solubility of such alloys in nitric acid, sulphuric acid, and hydrochloric acid.

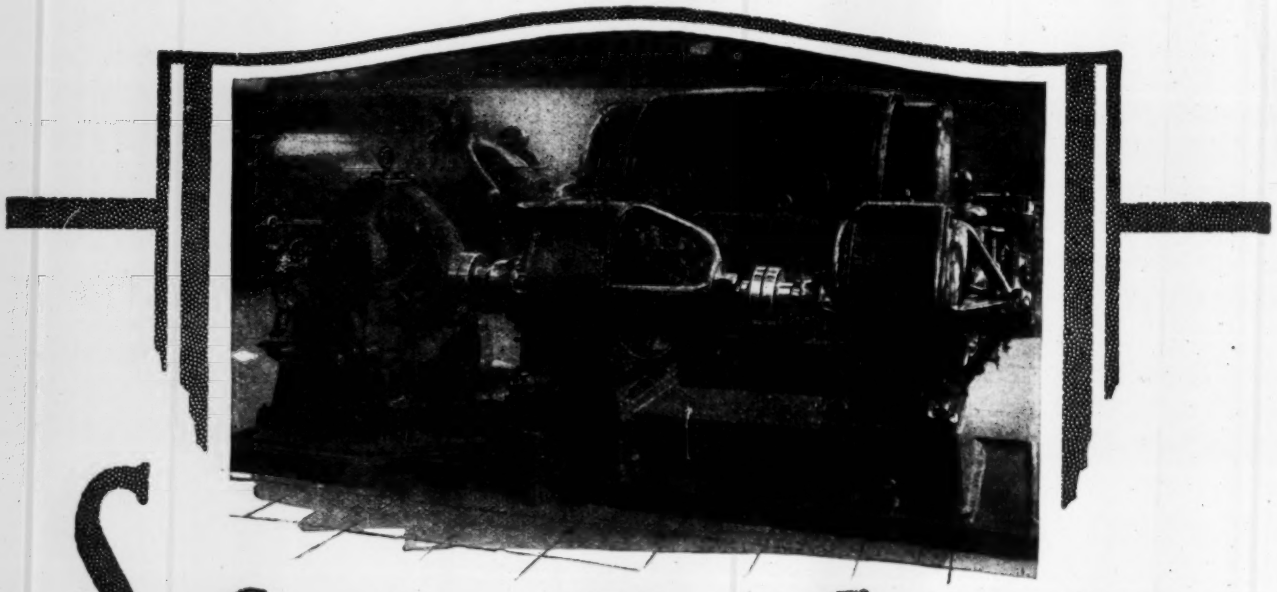
Corrosion Cracking. The Corrosion Cracking of Steel under the Influence of Internal Stresses, Albert M. Portevin. Iron & Steel Inst.—Advance Paper, no. 11, for Meeting Sept. 1923, 19 pp., 10 figs. Observations referring to cracking of certain shells, and reasons which have led to its being regarded as result of presence of internal stresses.

Grain Growth. Abnormal Grain Growth in Cold Rolled Low Carbon Steel, Victor E. Hillman and Frederick L. Coonan. Am. Soc. Steel Treating—Trans., vol. 4, no. 2, Aug. 1923, pp. 162–170, 9 figs. Reviews research work conducted in determining factors and conditions causing abnormal grain growth in steel, resulting from annealing critically cold-rolled low-carbon steel.

Grain Growth in Iron and Steel, Hsi C. Wang. Iron & Steel Inst.—Advance Paper, no. 15, for Meeting Sept. 1923, 11 pp., 8 figs. on supp. plate. Literature of grain growth; author's experiments; theories in strained metal.

Hydrogen Decarburization. The Relative Efficiency of Dry and of Moist Hydrogen on the Decarburisation of Steel at 950° C., and the Effect of Hydrogen on the Phosphorus Content, E. D. Campbell, John F. Ross and W. L. Fink. Iron & Steel Inst.—Advance Paper, no. 3, for Meeting, Sept. 1923, 7 pp. It is concluded from results of experiments that (1) double carbides of iron and chromium are more stable than those of pure iron alone; (2) moist hydrogen is not only more efficient than dry hydrogen in decarburization at 950 deg. cent., but is essential to complete decarburization; (3) neither moist nor dry hydrogen at 950 deg. has any effect on phosphorus content of steel.

Microscopic Examination. Microscope Aids Steel Selection, E. C. Smith. Iron Trade Rev., vol. 73, no. 10, Sept. 6, 1923, pp. 673–677 and 669–680, 31



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figs. Application of microscope to production of satisfactory gears in a satisfactory commercial way; reviews gear development. From paper read before Am. Gear Mfrs.' Assn.

Nickel. See NICKEL STEEL.

Pressed, Failures in. Strains in Pressed Low Carbon Steel, Wm. J. Merten. Forging—Stamping—Heat Treating, vol. 9, no. 8, Aug. 1923, pp. 354–356, 7 figs. Metals subjected to drawing, stamping or pressing operations are severely strained; failures are frequent unless material is annealed at various stages.

Refining. Theory and Practice of Steel Refining, Haakton Styri. Iron & Steel Inst.—Advance Paper, no. 13, for Meeting Sept. 1923, 39 pp., 3 figs. Author seeks to show that all reactions between oxygen and usual elements take place simultaneously; it is consequently quite impossible for silicon only to react with oxygen in dioxidizing.

Sheet, Swaging of. Swaging of Sheet Steel, Brass or Aluminum (Considérations sur la fabrication par emboutissage des objets a parois minces, d'épaisseur uniforme; objets en tôle d'acier, en laiton, en aluminium), J. Thomas. Revue de Métallurgie, vol. 20, nos. 4 and 5, Apr. and May 1923, pp. 225–247 and 307–319, 34 figs. Explains swaging of forms of objects from thin sheets of uniform thickness; describes production of metal goods such as cylinder covers, etc.; raw materials used in manufacture of swaging tools; tempering and heat treating of steel, including new method of tempering which does not cause cracks.

Stainless. Stainless Steel. Foundry Trade Jl. vol. 28, no. 365, Aug. 16, 1923, pp. 131–135, 23 figs. Practical application of stainless steel in hydraulic and steam-plant problems.

Stainless Steels from the Point of View of the Glass Industry, W. H. Hatfield. Soc. Glass Technology—Jl., vol. 7, no. 26, June 1923, pp. 142–148 and (discussion) 149–153, 3 figs. Strength of stainless steel as shown by mechanical tests; mechanical properties; polishing, grinding, and finishing; hardening and tempering; microstructure; physical properties.

Stainless Steel—Its Properties and Some of Its Engineering Applications, J. H. G. Monypenny. Mech. World, vol. 74, nos. 1907 and 1910, July 27 and Aug. 10, 1923, pp. 57 and 88–89. Corrosion differences; effects of heat treatment; air-hardening properties; resistance to corrosion; mechanical properties and composition. (Abstract.) Paper read before Cleveland Instn. Engrs.

Vanadium. See VANADIUM STEEL.

Zirconium in, Effects of. Some Effects of Zirconium in Steel, Alexander L. Feild. Am. Inst. Min. & Met. Engrs.—Trans., no. 1266-S, Aug. 1923, 36 pp., 11 figs. and (abstract) Min. & Metallurgy, vol. 4, no. 200, Aug. 1923, pp. 420–421. Deals with plain carbon steel only. Description of methods of experimental steel manufacture and laboratory testing; discusses in the light of typical analyses preferential chemical reaction of zirconium with oxygen, nitrogen, and sulphur in steel; explains by means of tentative working theory, the various effects on mechanical properties of steel.

STEEL CASTINGS

Heat Treatment. Heat Treat To Improve Castings, A. W. Lorenz. Foundry, vol. 51, no. 18, Sept. 15, 1923, pp. 740–741, 2 figs. Tests show that chrome-nickel steel and other castings have been improved by heat treatment which shows up defects in design. (Abstract.) Paper read before Am. Foundrymen's Assn.

Large, Production of. The Use of the Small Converter for the Production of Large Steel Castings, C. Vanzetti. Iron & Steel Inst.—Advance Paper, no. 14, for Meeting Sept. 1923, 9 pp., 3 figs. partly on supp. plates. Describes practice in steel foundry of Milan, Italy, using Robert converters for production of large castings.

STEEL INDUSTRY

Sheet Sales and Production. Sheet Sales and Production Analyzed, W. Herman Greul. Iron Age, vol. 112, no. 11, Sept. 13, 1923, pp. 682–683, 5 figs. Comparable trend charts as aid in determining relations of inventories, production and shipments.

STEEL MANUFACTURE

Deoxidizing Agents, Action of. The Complex Action of Manganese and Other So-Called Deoxidising Agents Used in the Manufacture of Steel, Federico Giolitti. Iron & Steel Inst.—Advance Paper, no. 6, for Meeting Sept. 1923, 14 pp. Discusses phenomenon known as transverse weakness and its causes.

STEEL WORKS

Bethlehem, Pa. Electrical Applications in Bethlehem Plant of Bethlehem Steel Company, D. M. Petty and A. J. Standing. Blast Furnace & Steel Plant, vol. 11, nos. 6 and 7, June and July 1923, pp. 304–310 and 368–377, 12 figs. Description of what Philadelphia section of Assn. Iron & Steel Elec. Engrs. saw on visit to these mills. June: Description of power generation and distribution features. July: Description of manufacturing departments.

China. Modern Iron and Steel Works in China, K. E. Humbert. Iron Age, vol. 112, nos. 8, 9 and 10, Aug. 23, 30 and Sept. 6, 1923, pp. 461–466, 534–537 and 598–601, 18 figs. Survey of plants and their sources of raw materials; combination of machinery with primitive transport and handling. Lungyen blast-furnace plant near Peking.

Scotland. Clydebridge Steel Works. Engineer, vol. 136, nos. 3531 and 3532, Aug. 31 and Sept. 7, 1923, pp. 218–220 and 245–248, 27 figs. partly on supp. plates and pp. 228 and 254. Steel works of David Colville & Sons, Ltd., are equipped for output of over 5000 tons of plates per week; detailed account of new plant following brief description of history and development of old works.

Yard Electrification. Electric Transportation, F. O. Schnure. Assn. Iron & Steel Elec. Engrs., vol. 5, no. 9, Sept. 1923, pp. 327–334, 1 fig. Notes on yard transportation within steel plant, and yard electrification.

STOKERS

Water-Tube Boilers. Mechanical Stokers for Marine Water Tube Boilers, W. J. Muller. Engineering, vol. 116, no. 3010, Sept. 7, 1923, pp. 297–299, 4 figs. Results from practical experience with mechanical stokers applied to marine water-tube boilers. Paper before Instn. Nav. Architects. See also Shipbldg. & Ships. Rec., vol. 22, no. 10, Sept. 6, 1923, pp. 292–294, 2 figs.

STREET RAILWAYS

Cars, Delmez Patent. Street Cars with Large Wheel Base, Ball Bearings and Special Suspension of Electric Motors (Voiture de Tramways à grande écartement d'essieux, roulements à billes et suspension speciale des moteurs électriques), G. Magnan. Industrie des Tramways, vol. 17, no. 119, July 1923, pp. 255–260, 8 figs. Describes Delmez patent, giving details of design and operation, its advantages, and tests made.

Cars, Light-Weight. Development of Light Weight Cars, W. J. Clardy. Elec. Traction, vol. 19, no. 8, Aug. 1923, pp. 393–394, 1 fig. City service in St. Louis, which is said to be typical of modern developments in this class of equipment.

Cars, Safety. Operating Results of Automatic Door Safety Cars, Charles Gordon. Elec. Ry. Jl., vol. 62, no. 8, Aug. 25, 1923, pp. 283–287, 4 figs. Regular operation of automatic exit door, double-truck, one-man safety cars on Chicago Surface Lines proves practicability. Method of studying and analyzing passenger movements in development of car design.

Flexible Transportation Equipment. Trolley Buses and Flexible Vehicles for Street Railway Service, William P. Kennedy. Soc. Automotive Engrs.—Jl., vol. 13, no. 3, Sept. 1923, pp. 179–195, 20 figs. Surveys some general conditions prevailing in street-railway field and prospective development of a new type of service, in discussing necessity for closer coöperation between engineers of automotive industry and operating organization of railways, idea being to develop flexible transportation equipment that will coördinate with operation of present railway-transportation facilities and to promote utilization, where feasible, of railway power supply in employment of flexible bus-type equipment in supplementing and extending railway-organization service.

Portsmouth, England. Portsmouth Corporation Tramways. Tram. & Ry. Jl., vol. 54, no. 10, Aug. 23, 1923, pp. 81–87, 7 figs. Details of tramway system in Portsmouth.

Traffic Problems. Tramways from a Traffic Point of View under Existing Conditions, E. S. Rayner. Inst. of Transport—Jl., vol. 4, no. 9, July 1923, pp. 394–399 and (discussion) 399–405, 3 figs. Modern traffic problems; capacity and length of tracks; load problems.

STROBOSCOPES

Mirror Type. High Speed Stroboscope. Engineering, vol. 116, no. 3009, Aug. 31, 1923, pp. 255–256, 5 figs. Describes apparatus developed by British Research Assn. for Woollen and Worsted Industries, Leeds, Eng., for observation of cap spinning; illuminates objects in a horizontal plane for a considerable radius from instrument, distance depending only on intensity of light source and darkness of room.

SUPERHEATERS

Testing Device. Device for Testing Superheater Units and Air Reservoirs. Boiler Maker, vol. 23, no. 8, Aug. 1923, pp. 226–227, 1 fig. Speed in operating and accuracy of testing are features of new device designed for use in Readville shops of N. Y., N. H. & H.

T

TERMINALS, RAILWAY

Freight. Burlington Develops Large New Freight Station. Ry. Age, vol. 75, no. 11, Sept. 15, 1923, pp. 475–479, 6 figs. Large terminal forms important feature of reconstruction in Chicago Union Depot area.

Jersey City, N. J. New Deep Water Terminal Put in Operation. Ry. Elec. Engr., vol. 14, no. 8, Aug. 1923, pp. 233–238, 8 figs. Lehigh Valley completes first unit of Claremont project for handling ore and miscellaneous freight.

TESTING MACHINES

Metal Strip. A New Testing Machine Reginald G. Johnston. Metal Industry (Lond.), vol. 23, no. 6, Aug. 10, 1923, pp. 109–110, 1 fig. Pile temper testing machine is said to possess advantages of ease of working, absence of calculations and portability of apparatus.

TEXTILE MILLS

Lighting. Reproduced Daylight and Quality Production, Hibbard S. Busby. Textile World, vol. 64, no. 8, Aug. 25, 1923, pp. 33–35, 7 figs. Functions and types of daylight lamps; importance of effective conditions for controlling manufacturing operations; utility of daylight apparatus and practical suggestions on use; special unit for dye house.

THERMOMETERS

Katathermometer. The Usefulness of the Katathermometer in Determining Healthful Air Conditions. Heating & Vent. Mag., vol. 20, no. 8, Aug. 1923, pp. 52–53. Results of new studies with this instrument, bearing on body heat and efficiency, showing numerous fields in which Katathermometer will prove of value.

TIME STUDY

Malleable Foundry. Time Study in a Malleable Foundry, Martin A. Harder. Iron Age, vol. 112, no. 12, Sept. 20, 1923, p. 748. Summary of factors taken into consideration; how it is applied in actual practice.

TRACTORS

Commercial. Development of Commercial Tractors, Pliny E. Holt. Army Ordnance, vol. 3, no. 19, July-Aug. 1923, pp. 12–14, 4 figs. Factors in design of Holt tractors making them suitable for military work.

TRAFFIC

Control, London Street Railway. Traffic Control on London County Council Tramways. Tram. & Ry. Jl., vol. 54, no. 10, Aug. 23, 1923, pp. 75–80, 11 figs. Telephone system adopted for use on northern section of London County Council Tramways.

TRANSPORTATION

Urban. Fields of Urban Transportation Agencies, Victor Topping. Can. Engr., vol. 45, no. 9, Aug. 28, 1923, pp. 265–267. Economic analysis of various methods of surface transportation, including electric traction, trolley bus and auto bus; cost of service per route-mile under various traffic conditions and headways. See also Elec. Ry. Jl., vol. 62, no. 8, Aug. 23, 1923, pp. 289–291.

V

VANADIUM STEEL

Use of. Vanadium Steel for Engineering Purposes. Mar. Engr. & Naval Architect, vol. 46, no. 551, Aug. 1923, pp. 308–310, 1 fig. Influence of vanadium as a steel ingredient; sources of supply of vanadium; range of application of vanadium steel; some remarkable results of tensile tests.

VISCOSIMETERS

Oil. Apparatus for Measuring Viscosity of Liquids (Les appareils pour la mesure de la viscosité des liquides), Jean Philippe. Ouvrier Moderne, vol. 6, no. 4, July 1923, pp. 141–146, 12 figs. Design and operation of various viscosimeters for lubricating oil and heavy fuel oils.

W

WAGES

Compensation Plan. A Compensation Plan That Works, William J. Franklin. Indus. Management (N. Y.), vol. 66, no. 3, Sept. 1923, pp. 149–150, 2 figs. How large plant reduced turnover and stimulated both teamwork and production.

WATER POWER

Green River, Colorado Basin. Green River as a Source of Power, Ralf R. Woolley. Jl. Electricity vol. 51, no. 4, Aug. 15, 1923, pp. 126–128, 5 figs. Surveys made on Green River; proposed methods of developing power.

WELDING

Bronze. A Masterpiece of Bronze Welding, Pendleton Powell. Brass World, vol. 19, no. 8, Aug. 1923, pp. 243–246, 4 figs. Welding cathedral bell in Berlin; some of the mechanical difficulties, method employed. Translated from Zeitschrift für gesammte Giessereipraxis.

Modern Practice. Modern Welding Practice. R. Gillespie Williams. Eng. Rev. & Trader, vol. 36, nos. 10 and 11, Apr. and May 1923, pp. 301–305 and 331–337, 18 figs. Description of equipment used in oxy-acetylene and arc welding; resistance-welding equipment and its applications.

[See also ELECTRIC WELDING; ELECTRIC WELDING, ARC; OXY-ACETYLENE WELDING.]

WIND TUNNELS

Dimensions. The Modification of Wind-Tunnel Results by the Wind-Tunnel Dimensions, Max M. Munk. Franklin Inst.—Jl., vol. 196, no. 2, Aug. 1923, pp. 203–213, 1 fig. Determines necessary corrections for influence of dimensions of wind tunnel on results of tests on wings and propellers.

WOOD

Plywood. Manufacture and Uses of Plywood, H. J. Townsend. Times Trade & Eng. Supp. (Timber Trades Section), July 28, 1923, pp. 24–25, 5 figs. English production; measurement; pricing; etc.

Alphabetical List of Advertisers

See Pages 118-134 for Classified List of Mechanical Equipment

Card Announcements of Consulting Engineers will be found on Pages 110, 111, 112, 113, 114 and 115

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*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

THE ENGINEERING INDEX

(Registered United States, Great Britain and Canada)

THE ENGINEERING INDEX presents each month, in conveniently classified form, items descriptive of the articles appearing in the current issues of the world's engineering and scientific press of particular interest to mechanical engineers. At the end of the year the monthly installments are combined along with items dealing with civil, electrical, mining and other branches of engineering, and published in book form, this annual volume having regularly appeared since 1906. In the preparation of the Index by the engineering staff of The American Society of Mechanical Engineers some 1200 technical publications received by the Engineering Societies Library (New York) are regularly reviewed, thus bringing the great resources of that library to the entire engineering profession.

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(See also page 730 of this issue for supplementary items.)

ABRASIVE WHEELS

Diamonds for Truing. Selection and Use of Diamonds for Dressing Grinding Wheels, Ward M. Robinson. Machy. (N. Y.), vol. 30, no. 2, Oct. 1923, pp. 133–136, 3 figs. Discusses general practice in handling this work and presents original information on use of truing diamonds.

Progress in Manufacture. Progress in Grinding Wheel Manufacture, P. H. Walker. Machy. (N. Y.), vol. 30, no. 2, Oct. 1923, pp. 102–103. Developments; records of performance; new developments in vitrified wheels; improvements in abrasives; advances in polishing grain.

ACCELEROMETERS

Impact-Measuring. Accelerometer for Measuring Impact, Earl B. Smith. Am. Soc. Testing Matls., advance paper, no. 74, for meeting June 25–29, 1923, 7 pp., 4 figs. Describes accelerometer of spring type, so constructed as to have eliminated effect of lag.

ACCIDENTS

Industrial. Industrial Accidents and Hygiene. Monthly Labor Rev., vol. 17, nos. 2 and 3, Aug. and Sept. 1923, pp. 163–175 and 134–142. Aug.: Quarry and metal-mine accidents in 1921; accidents in Portland cement and in metal and woodworking industries in 1922; accident prevention in foundries; diagnosis of CO poisoning; industrial eye injuries; report of Belgian Commission on use of lead in painting; causes and prevention of blindness in Great Britain; industrial accidents in Sweden in 1919. Sept. Health hazards in photo-engraving; hydrogen sulphide as industrial poison; metal-fume fever; effect of locomotive smoke on trainmen in railway tunnels.

AERONAUTICAL INSTRUMENTS

Altitude Instruments. Calculating Altitudes for Record Purposes, Charles H. Colvin. Aviation, vol. 15, no. 15, Oct. 8, 1923, p. 440. It is shown that height-measuring instruments, both barographs and altimeters, are quite adequate for purposes for which they are used.

Barograph. The De Bothezat Barograph, Type "A," W. F. Gerhardt. Air Service Information Circular, vol. 5, no. 439, May 1, 1923, 11 pp., 16 figs. Instrument consists of large silk bellows connected to expansion tank in which presence is automatically brought to atmospheric at limit of expansion by special valve and system of electrical contacts.

AIR COMPRESSORS

Crankless. A Crankless Air Compressor. Power, vol. 58, no. 14, Oct. 2, 1923, p. 530, 2 figs. Crankless engine designed by A. G. M. Michell, which is adaptable, with modification in valve gear to use as air compressor, uniflow steam engine, gas engine, etc.; details of compressor.

Diesel-Driven for Pumping Plant. Air-Lift Pumping by Diesel Compressor, P. M. Thayer. Power Plant Eng., vol. 27, no. 19, Oct. 1, 1923, pp. 994–996, 3 figs. City of Fond du Lac has reduced cost of pumping by addition of Diesel compressor unit to water plant.

AIR CONDITIONING

Humidifying Plants. Humidifying Plants in Textile Mills, P. Martell. Eng. Progress, vol. 4, no. 8, Aug. 1923, pp. 176–178, 5 figs. Importance of saturating air with moisture for manufacturing process and for sanitary conditions; types and individual parts of humidifying plants; moisture meters.

AIR PUMPS

Radojet. Steam Condensing Auxiliaries. Beama, vol. 13, no. 65, Sept. 1923, pp. 191–194, 5 figs. Describes Radojet air pump, principal characteristic of which is use of steam jets for removal of air; types, advantages; operation; Radojets with intercondensers; application in various industries.

AIRCRAFT

Airworthiness, Regulations for. Regulations Governing the Issuance of Certificates of Airworthiness of Aircraft in France. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 155, Aug. 1923, 46 pp. Regulations approved by Under Secretary of State for Aeronautics. Translated from Bul. de la Navigation Aérienne, Mar. 1923.

Altitude Determination. The Determination of the Altitude of Aircraft, W. G. Brombacher. Optical Soc. Am.—Jl., vol. 7, no. 9, Sept. 1923, pp. 719–724, 13 figs. Practical method of determining altitude of aircraft above surface of earth, based on relations of altitude to various properties of air.

AIRCRAFT CONSTRUCTION MATERIALS

Steels. Steel Structural Parts for Aircraft, Horace C. Knerr. Iron Age, vol. 112, no. 13, Sept. 27, 1923, pp. 816–820, 3 figs. Control in their heat treatment; alloy steels which have been adopted; use of metal in aircraft increasing.

AIRPLANE ENGINES

Absolute Ceiling, Determination of. Engine Performance and the Determination of Absolute Ceiling, Walter S. Diehl. Nat. Advisory Committee for Aeronautics—Report, no. 171, 1923, 12 pp., 5 figs. Brief study of variation of engine power with temperature and pressures.

Carburetors. See CARBURETORS.

AIRPLANE PROPELLERS

Design. Adaptation of Propellers to Airplanes (Adaptation des Hélices aux Avions), M. Lamé. Aérophile, vol. 31, no. 13–14, July 1–15, 1923, pp. 209–211. Relation and proper adjustment between engine, propeller and plane; power of propellers; power available and power used.

Model Tests, Analysis of. Analysis of Dr. Schaffran's Propeller Model Tests, Max M. Munk. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 158, Sept. 1923, 13 pp., 8 figs. Extension of author's analysis of Dr. Durand's propeller model tests, adding now the slip curves obtained from tests made with different arrangement of test and with propellers with more than two blades; series of tests now analyzed is said to be a very complete and systematic one.

AIRPLANES

Cox-Klemin Training. Static Test of the Cox-Klemin TW-2 Training Airplane, A. S. No. 68,540, D. B. Weaver. Air Service Information Circular, vol. 5, no. 437, May 1, 1923, 24 pp., 39 figs. Test conducted for purpose of determining structural strength of Cox-Klemin TW-2.

Curtiss-Navy Racer. Curtiss Plane, Pulitzer Race Winner, Embodies New Design Features. Automotive Industries, vol. 49, no. 15, Oct. 11, 1923, pp. 742–743, 3 figs. Controlling mechanism changed materially from last year's design; engine altered slightly; new duralumin propeller employed.

Gliders. Report on Gliders, J. A. Roché. Air Service Information Circular, vol. 5, no. 444, May 1, 1923, 13 pp., 10 figs. Purpose of report is to set forth clear and simple methods for analysis of glider performance on different kinds of winds; value of gliders to aeronautics; effect of topography on soaring; different types of gliders; criteria for selection of soaring site.

Huff-Daland Training. Huff-Daland Model TA6 Advanced Training Plane. Aviation, vol. 15, no. 14, Oct. 1, 1923, pp. 408–409, 2 figs. Safety, simplicity and ease of alignment and assembly chief features of new plane, equipped with 200-hp. Wright-Lawrance J1 radial engine.

Laird Limousine. The Laird Five-Passenger Limousine Plane. Aviation, vol. 15, no. 13, Sept. 24, 1923, p. 371, 1 fig. New cabin plane equipped with 300-hp. Packard engine.

Metal. Metal Aeroplane Construction, Hugo Junkers. Roy. Aeronautical Soc.—Jl., vol. 27, no. 153, Sept. 1923, pp. 406–449, 53 figs. Outline of author's work in development of metal-airplane construction; discusses evolution of his metal plane and method of proceedings and working adopted; advantages of metal construction.

Racing. How Modern Racing Planes are Developed, Frank H. Russell. Aviation, vol. 15, no. 13, Sept. 24, 1923, pp. 366–367, 3 figs. Short synopsis of procedure necessary to create machine as near perfect as possible in relatively short time.

Roll, Damping Factor in. Preliminary Study of the Damping Factor in Roll, James M. Shoemaker and John G. Lee. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 161, Oct. 1923, 23 pp., 6 figs. Theoretical discussion of damping factor in roll, together with results of wind-tunnel tests on continuous rolling of U. S. A.-30 airfoil.

Seaplanes. See SEAPLANES

Sport. The Small Mark Sport Airplane R III/23 (Das kleine Mark-Sportflugzeug "R III/23"), G. Reinhard. Motorwagen, vol. 26, no. 20, July 31, 1923, p. 327, 1 fig. A semi-overhung, strutless, one-seated machine with air-cooled two-cylinder four-stroke engine.

Stability. Dynamic Stability as Affected by the Longitudinal Moment of Inertia, Edwin B. Wilson. Nat. Advisory Committee for Aeronautics—Report, no. 172, 1923, 8 pp. Results of tests with experimental airplane; investigation of period, and damping; note on short oscillations; lateral stability.

Structural Parts. Fittings and Other Structural Parts of Airplanes, P. Eydam. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 160, Oct. 1923, 22 pp., 37 figs. Fittings for wing spar joints and for strut connections; internal bracing; bracing wires; control and landing gear. Translated from Technische Berichte, vol. 3, no. 6.

Wings. Comparing Aerodynamical Properties of Wings, W. Klemperer and T. Bienen. Aviation, vol. 15, no. 13, Sept. 24, 1923, pp. 368–370, 3 figs. With special reference to aspect ratio and parasite drag.

Wren. The "Wren" Light 'Plane. Flight, vol. 15, no. 34, Aug. 23, 1923, pp. 503–504, 3 figs. General arrangements "Wren" light airplane, fitted with 3-hp. A. B. C. engine. Maximum speed about 25 m. p. h.

AIRSHIPS

Italian. Latest Progress in Italy in the Technical Construction of Dirigibles (Sugli ultimi progressi realizzati in Italia nella tecnica costruttiva dei dirigibili), U. Nobile. Giornale del Genio Civile, vol. 61, no. 5, May 31, pp. 317–330, 19 figs. partly on

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Note.—The abbreviations used in indexing are as follows:

Academy (Acad.)
American (Am.)
Associated (Assoc.)
Association (Assn.)
Bulletin (Bul.)
Bureau (Bur.)
Canadian (Can.)
Chemical or Chemistry (Chem.)
Electrical or Electric (Elec.)
Electrician (Elecn.)
Engineer[s] (Engr.[s])
Engineering (Eng.)
Gazette (Gaz.)
General (Gen.)
Geological (Geol.)
Heating (Heat.)
Industrial (Indus.)
Institute (Inst.)
Institution (Instn.)
International (Int.)
Journal (Jl.)
London (Lond.)
Machinery (Machy.)
Machinist (Mach.)
Magazine (Mag.)
Marine (Mar.)
Materials (Matls.)
Mechanical (Mech.)
Metallurgical (Met.)
Mining (Min.)
Municipal (Mun.)
National (Nat.)
New England (N. E.)
Proceedings (Proc.)
Record (Rec.)
Refrigerating (Refrig.)
Review (Rev.)
Railway (Ry.)
Scientific or Science (Sci.)
Society (Soc.)
State names (Ill., Minn., etc.)
Supplement (Supp.)
Transactions (Trans.)
United States (U. S.)
Ventilating (Vent.)
Western (West.)

Classified List of Mechanical Equipment

Manufactured by Firms Represented in MECHANICAL ENGINEERING

FOR ALPHABETICAL LIST OF ADVERTISERS, SEE PAGE 166

Accumulators, Hydraulic
Mackintosh-Hemphill Co.
* Worthington Pump & Mchry. Corp'n

Aftercoolers, Air
* Ingersoll-Rand Co.

Air Compressors, Receivers, etc.
(See Compressors, Receivers, etc., Air)

Air Conditioning Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
* Clarage Fan Co.
* Sturtevant, B. F. Co.

Air-Jet Lifts
* Schutte & Koerting Co.

Air Washers
* American Blower Co.
* Carrier Engineering Corp'n
* Clarage Fan Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Sturtevant, B. F. Co.

Ammeters
* Bristol Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Anemometers
* Taylor Instrument Cos.
Weber, F. Co. (Inc.)

Annealing
* American Metal Treatment Co.

Arches, Boiler Furnace
* Liptak Fire-Brick Arch Co.
* McLeod & Henry Co.
* Titusville Iron Works Co.

Arches, Fire Door
* McLeod & Henry Co.

Arches, Ignition (Flat Suspended)
* Combustion Engineering Corp'n
* Liptak Fire-Brick Arch Co.
* McLeod & Henry Co.

Asbestos Products
Johns-Manville (Inc.)

Ash Lifts, Telescopic
* Gillis & Geoghegan

Axles, Car
* Fuller-Lehigh Co.

Babbitt Metal
* Medart Co.
* Westinghouse Electric & Mfg. Co.

Ball Bearings, Gages, etc.
(See Bearings, Gages, Ball)

Balls, Brass and Bronze
* Gwilliam Co.

Balls, Steel
* Atlas Ball Co.
* Gwilliam Co.
* New Departure Mfg. Co.
* S K F Industries (Inc.)

Barometers
* American Schaeffer & Budenberg Corp'n
* Taylor Instrument Cos.

Barometers, Mercurial
* Tagliabue, C. J. Mfg. Co.

Bearings, Ball
Fafnir Bearing Co.
Gurney Ball Bearing Co.
* Gwilliam Co.
* New Departure Mfg. Co.
* Norma Co. of America
* S K F Industries (Inc.)
* U. S. Ball Bearing Mfg. Co.

Bearings, Radial Thrust
* New Departure Mfg. Co.

Bearing, Roller
* Gwilliam Co.
* Hyatt Roller Bearing Co.
* Norma Co. of America
* Royersford Fdry. & Mach. Co.
* Timken Roller Bearing Co.

Bearings, Self-Oiling
* Brown, A. & F. Co.
* Doehler Die-Casting Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Bearings, Thrust
Fafnir Bearing Co.
* General Electric Co.
* Gwilliam Co.
* Norma Co. of America
* S K F Industries (Inc.)
* Timken Roller Bearing Co.
* U. S. Ball Bearing Mfg. Co.

Belt Dressing
* Dixon, Joseph Crucible Co.
Texas Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Hinge)
Flexible Steel Lacing Co.

Belt Lacing, Steel
* Bristol Co.

Belt Tighteners
* Brown, A. & F. Co
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Smidth, F. L. & Co.
* Wood's, T. B Sons Co.

Belting, Canvas (Stitched)
* United States Rubber Co.

Belting, Conveyor
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Belting, Elevator
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Belting, Leather
American Sole & Belting Leather Tanners (Inc.)

Belting, Rubber
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Benches, Work
Manufacturing Equip. & Engrg. Co.

Bending & Straightening Machines
* Long & Allstatter Co.

Bends, Pipe
* Frick Co. (Inc.)
* Vogt, Henry Machine Co.

Billets, Steel
* Timken Roller Bearing Co.

Bleaching Machinery
Philadelphia Drying Mchry. Co.

Blocks, Tackle
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Blowers, Centrifugal
* American Blower Co.
* Clarage Fan Co.
* Coppus Engineering Corp'n
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Blowers, Fan
* American Blower Co.
* Clarage Fan Co.
* Coppus Engineering Corp'n
* Green Fuel Economizer Co.
* Sturtevant, B. F. Co.

Blowers, Forge
* Sturtevant, B. F. Co.

Blowers, Pressure
* American Blower Co.
* Clarage Fan Co.
Lammert & Mann Co.
* Sturtevant, B. F. Co.

Blowers, Rotary
Lammert & Mann Co.
* Schutte & Koerting Co.
* Sturtevant, B. F. Co.

Blowers, Soot
Diamond Power Specialty Corp'n
* Sturtevant, B. F. Co.

Blowers, Steam Jet
* Schutte & Koerting Co.

Blowers, Turbine
* Coppus Engineering Corp'n
* Sturtevant, B. F. Co.

Blueing (Metal)
* American Metal Treatment Co.

Boards, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Boiler Baffles
* King Refractories Co. (Inc.)
* McLeod & Henry Co.

Boiler Compounds
* Dixon, Joseph Crucible Co.
Unisol Mfg. Co.

Boiler Coverings, Furnaces, Tube Cleaners, etc.
(See Coverings, Furnaces, Tube Cleaners, etc., Boiler)

Boiler Fronts
* Brownell Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.

Boiler Settings, Steel Cased
* Brownell Co.
* Casey-Hedges Co.
* McLeod & Henry Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Boilers, Heating
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Locomotive
* Brownell Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Marine (Scotch)
* Brownell Co.
* Casey-Hedges Co.
* Leffel, James & Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Boilers, Marine (Water Tube)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Connelly, D. Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Portable
* Brownell Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Frick Co. (Inc.)
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Tubular (Horizontal Return)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Connelly, D. Boiler Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.
* Webster, Howard J.
* Wickes Boiler Co.

Boilers, Tubular (Vertical Fire)
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
Clyde Iron Works Sales Co.
* Keeler, E. Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* O'Brien, John Boiler Works Co.
* Titusville Iron Works Co.
* Union Iron Works
* Walsh & Weidner Boiler Co.

Boilers, Water Tube (Horizontal)
* Babcock & Wilcox Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Connelly, D. Boiler Co.
* Edge Moor Iron Co.
* Erie City Iron Works
Herbert Boiler Co.
* Keeler, E. Co.
* Ladd, George T. Co.
Morrison Boiler Co.
* O'Brien, John Boiler Works Co.
* Springfield Boiler Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boilers, Water Tube (Inclined)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Keeler, E. Co.
* Ladd, George T. Co.
Morrison Boiler Co.
* O'Brien, John Boiler Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.
* Ward, Charles Engineering Wks.

Boilers, Water Tube (Vertical)
* Babcock & Wilcox Co.
* Bigelow Co.
* Casey-Hedges Co.
* Erie City Iron Works
* Keeler, E. Co.
* Ladd, George T. Co.
Morrison Boiler Co.
* O'Brien, John Boiler Works Co.
* Walsh & Weidner Boiler Co.
* Wickes Boiler Co.

Boxes, Carbonizing
Driver-Harris Co.

Boxes, Case Hardening
Driver-Harris Co.

Brake Blocks
Johns-Manville (Inc.)

Brakes, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.

Brass Goods
* Scovill Mfg. Co.

Breechings, Smoke
* Brownell Co.
Morrison Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Brick, Fire
* Bernitz Furnace Appliance Co.
* Celite Products Co.
* Drake Non-Clinkering Furnace Block Co.
Keystone Refractories Co.
* King Refractories Co. (Inc.)
* McLeod & Henry Co.

Brick Insulating
* Celite Products Co.
* Quigley Furnace Specialties Co.

Bridges, Coal & Ore Handling
* Brown Hoisting Machinery Co.
Link-Belt Co.

Bridgewalls (Furnace)
* McLeod & Henry Co.

Buckets, Elevator
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Buckets, Grab
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
Link-Belt Co.

Buckets, Self-Dumping
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Burners, Oil
* Best, W. N. Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Morse Dry Dock & Repair Co.
(Fuel Oil Engrg. Dept.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Burners, Powdered Fuel
* Quigley Furnace Specialties Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

supp. plate. Details of design, construction and equipment of S. C. A., O. S., P. M., and N. dirigibles, built by Stabilimento di Costruzioni Aeronautiche in Rome.

Transatlantic Service. A Transatlantic Airship Service, W. T. Blake. Discovery, vol. 4, no. 45, Sept. 1923, pp. 227–230, 3 figs. Plan for service between Europe and South America. Design of proposed ships.

ALLOY STEELS

Elements in, Influence of. Steel Alloys. Automobile Engr., vol. 13, no. 180, Sept. 1923, pp. 273–274. Notes on influence of various elements, including carbon, sulphur, manganese, phosphorus, vanadium, chromium and nickel.

[See also AIRCRAFT CONSTRUCTION MATERIALS, Steels.]

ALLOYS

Aluminum Bronze. See ALUMINUM BRONZE.

Bearing Metals. See BEARING METALS.

Brass. See BRASS.

Copper. See COPPER ALLOYS.

Duralumin. See DURALUMIN.

Gun Metal. See GUN METAL.

Magnesium. See MAGNESIUM ALLOYS.

Zinc. See ZINC ALLOYS.

ALUMINUM BRONZE

Cavities in. The Occurrence of Cavities in Aluminium Bronze, J. Gallibourg and A. Brizon. Foundry Trade Jl., vol. 28, no. 371, Sept. 27, 1923, pp. 368–369. Study of casting conditions and results arising from investigation; pouring methods. Translated from paper presented to Paris Foundry Congress.

APPRENTICES, TRAINING OF

Foundry. Training Foundry Apprentices at the Falk Corporation, H. A. Frommelt. Foundry Trade Jl., vol. 28, no. 369, Sept. 13, 1923, pp. 231–233. Program put into effect in plant of Falk Corp., which has a more or less general manufacturing engineering business, specializing in helical gears and railway castings; factors which have made training a success. Paper presented before Am. Foundrymen's Assn.

ASHES

Combustible Matter in. Combustible Matter in Boiler Ashes, W. S. Patterson. Chem. & Industry, vol. 42, no. 38, Sept. 21, 1923, pp. 904–906, 1 fig. Causes of "mechanical losses;" presents graph showing for different amounts of ash in coal the relationship between combustible matter in ashes and actual weight of ashes discharged.

AUTOMOBILE ENGINES

Cooling Systems. New Water-Steam Cooling System Operates Without Pump, C. I. Preston. Automotive Industries, vol. 49, no. 12, Sept. 20, 1923, pp. 581–582, 3 figs. Lowergan system can be used with either conventional forced or thermo-siphon circulation; condenser prevents loss of water; radiator is said to be uninjured by freezing and has device to facilitate thawing.

Crankless. The Michell Crankless Motor-Car Engine and Air Compressor. Engineering, vol. 116, no. 3014, Oct. 5, 1923, pp. 427–430, 10 figs. partly on p. 432. Details of engine as developed for automobile purposes, of 8-cylinder type designed to develop 35 b. hp. at 1250 r. p. m.; principle has also been developed in connection with design of air compressors.

Opposed-Piston. Scavenging-Piston Two-Stroke Engine (Spulkolben-Zweitakt-Motor), Hugo Ruppe. Motorwagen, vol. 26, no. 20, July 31, 1923, pp. 325–326, 5 figs. Describes new Bekamo engine developed by author, introducing automatic, opposed pump piston.

Wisconsin Motor Co. Six-Cylinder Passenger Car Engine Announced by Wisconsin. Automotive Industries, vol. 49, no. 13, Sept. 27, 1923, pp. 640–642, 3 figs. Has overhead valves, 3¹ ₈-in. bore and 5-in. stroke; rated at 75 hp. at 3000 r. p. m.; designed for high-class car.

AUTOMOBILE FUELS

Alcohol. Production of Industrial Alcohol (La préparation industrielle de l'alcool), Eug. Grandmougin. Génie Civil, vol. 83, nos. 9, 10 and 11, Sept. 1, 8 and 15, 1923, pp. 198–202, 224–228 and 246–248, 5 figs. Production of alcohol for use as motor fuel; describes fermentation and chemical processes.

France. The Problem of a National Motor Fuel in France. Société des Ingenieurs Civils de France—Mémoirs et Compte Rendu des Travaux, vol. 76, no. 1–3, Jan.-Mar. 1923. Includes following articles: Problem of a National Motor Fuel in France, Its Evolution and Present State, Daniel Berthelot, pp. 31–59; Problem of a National Motor Fuel, Its Scientific Bases, Georges Baume, pp. 60–80, 1 fig.; Tests Made by Compagnie Générale des Omnibus de Paris and Société des Transports en Commun de la Région Parisienne with a View to Using Motor Fuels with Alcohol Base, J. Peridier, pp. 81–149, 19 figs.; National Motor Fuel, E. Barbet, pp. 151–158; France's Motor Fuel Situation, A. Grebel, pp. 159–179, 2 figs.; Use of Naphthalene for Manufacture of a National Motor Fuel, L. Roman, pp. 180–208; The National Motor Fuel and Our Agricultural Resources, P. Verola, pp. 209–216; National Motor Fuel, René Le Grain, pp. 217–226, 2 figs.; Manufacture of Absolute Alcohol, J. Nourry, pp. 227–233, 1 fig.; National Motor Fuel or National Engine?, Marcel de Connick, pp. 234–241; How to Satisfy France's Motor Fuel Needs by Her Own Resources Alone, G. Patart, pp. 242–279, 3 figs. partly on supp. plate; National Motor Fuel (Conclusions), Daniel Berthelot, pp. 280–294, 3 figs.; and Power and Output of Light Motors Fed by Non-Detonating Fuels, F. Schwers, pp. 295–367, 1 fig.

Heavy-Oil. Heavy Oil for Motor Cars, A. Heller. Eng. Progress, vol. 4, no. 8, Aug. 1923, pp. 171–173, 6 figs. New service methods of Berlin Gen. Omnibus Co. and German State Post.

[See also BENZOL; GASOLINE; INTERNAL-COMBUSTION ENGINES, Fuels for.]

AUTOMOBILES

Austrian Steyr. The Steyr Chassis. Automobile Engr., vol. 13, no. 180, Sept. 1923, pp. 258–264, 13 figs. Six-cylinder Alpine Steyr car is Austrian production made by Oesterreichische Waffenfabriks-Gesellschaft. Details of engine, transmission, suspension, rear and front axles, steering, etc.

Axle Weights. Ascertaining Axle Weights, A. Lampert. Motor Transport (Lond.), vol. 37, no. 964, Aug. 20, 1923, pp. 233–234, 4 figs. Simple method of finding out how the gross load of a vehicle is distributed on its axles.

Berliet. The 15.9 Hp. Berliet Car. Auto-Motor Jl., vol. 28, no. 36, Sept. 6, 1923, pp. 749–752, 12 figs. French car of typical continental design; has monobloc 4-cylinder engine combined with clutch and gear.

Beverley-Barnes. The 24–80 Hp. Beverley-Barnes Straight-Eight Car. Autocar, vol. 51, no. 1457, Sept. 21, 1923, pp. 506–508, 6 figs. Has straight-eight engine, with unusual plug position.

Bianchi. The 15 Hp. 2-Litre Bianchi Car. Auto-Motor Jl., vol. 28, no. 38, Sept. 20, 1923, pp. 791–794, 11 figs. New model of well-known Italian car; gearbox, propeller torque tube and back axle are one unit with gear at forward end of torque tube.

Bodies. Light Weight with Endurance in Body Construction. Motor Transport (N. Y.), vol. 29, no. 4, Sept. 15, 1923, pp. 130–131, 3 figs. Plymetl, a material specially made to withstand unusual strains and weather. Has rust-resisting qualities and reduces chafing.

New Product May Solve Body Finishing Problem, O. H. Briggs. Automotive Mfr., vol. 65, no. 5, Aug. 1923, pp. 12–13. Durability, glass-like hardness, easy manipulation, high-varnish gloss or satin surface as desired, and quick drying are characteristics of Duco finish.

Brakes. Air Brakes Claimed to Increase Life of Facing and Drum. Motor Transport (N. Y.), vol. 29, no. 4, Sept. 15, 1923, pp. 126–127, 3 figs. Westinghouse device fitted with steel shoes and metal liners; under test shows material improvement in service; installation of air device requires no alterations in original chassis design.

Cadillac. New Cadillac Model Includes Radical Mechanical Changes. Automotive Mfr., vol. 65, no. 6, Sept. 1923, pp. 7–9, 3 figs. Four-wheel service brakes, entirely different engine balancing, lower chassis in 1924 model; superior coachwork.

Chassis, Long-Distance. A Long-Distance Coach Chassis. Motor Transport (Lond.), vol. 37, no. 964, Aug. 20, 1923, pp. 243–244, 2 figs. Six-cylinder, 4-wheel braked car adapted to standard and special body construction, and designed for comfortable riding.

Citroen, Care and Maintenance. Care and Maintenance of Citroën Cars. Autocar, vol. 51, nos. 1454 and 1455, Aug. 31 and Sept. 7, 1923, pp. 384–386 and 413–415, 10 figs. Attention necessary to secure best results; adjustments which may become necessary in course of usage.

Cooper. Characteristics of the 11 Hp. Cooper. Autocar, vol. 51, no. 1454, Aug. 31, 1923, pp. 389–390, 2 figs. Component-built vehicle with Coventry Climax engine, 66 by 100-mm. bore and stroke, fitted with crankshaft carried on two ball bearings, detachable cylinder head and side valves, cooling being by thermo-siphon circulation through nickel-silver-cased radiator.

Gear Change. Gear-Changing Made Easy. Autocar, vol. 51, no. 1455, Sept. 7, 1923, pp. 411–412, 3 figs. Device with which it is impossible to make a bad gear change at any speed; known as Mitchell gear change.

German. The 6/18-Hp. Dixi Automobiles of the Eisenach Automobile Factory (Germany) (Der 6/18 PS-Dixi-Wagen der Fahrzeugfabrik Eisenach), A. Heller. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 39–40, Sept. 29, 1923, pp. 941–944, 15 figs. Details of chassis of sport two-seater. See also Motorwagen, vol. 26, no. 27, Sept. 30, 1923, pp. 410–414, 15 figs.

H. E. 2-Liter. The 2-Litre H. E. Car. Auto-Motor Jl., vol. 28, no. 37, Sept. 13, 1923, pp. 769–772, 13 figs. Equipped with 4-cylinder engine having 72.5-mm. bore and 120-mm. stroke; general arrangement includes monobloc engine and clutch as separate unit.

Headlighting-Device Performance. Illumination Diagrams for Showing Head-Lighting Device Performance, F. H. Ford. Soc. Automotive Engrs.—Jl., vol. 13, no. 4, Oct. 1923, pp. 333–337, 6 figs. Author recommends arrangement for denoting intensity by varying degrees of tint on surface of chart that is supposed to represent roadway; method of comparing devices by illumination charts that illustrate performance of headlighting devices.

Heim. Low Center of Gravity Features German Car. Automotive Industries, vol. 49, no. 12, Sept. 20, 1923, p. 575, 1 fig. In new Heim car, floor of body is brought down to level of running boards and bottom of underpan; seats lowered accordingly; frame is wide.

Lea-Francis. The 10 Hp. Lea-Francis Light Car. Auto-Motor Jl., vol. 28, no. 35, Aug. 30, 1923, pp. 727–730, 12 figs. New model with overhead valves and comfortable occasional four-seater body.

Oldsmobile. New Oldsmobile Model Has Six Cylinder L-Head Engine, W. L. Carver. Automotive Industries, vol. 49, no. 13, Sept. 27, 1923, pp. 634–639, 11 figs. Among characteristics are 3-speed gearset, tubular propeller shaft, fabric universal joints, and semi-floating rear axle.

Overland. Detachable Seats Are Chief Feature of New Overland Sedan. Automotive Industries, vol. 49, no. 14, Oct. 4, 1923, pp. 694–695, 3 figs. Interior can be used for various purposes; volume of space back of front seat is 50 cu. ft.; exterior construction is all steel, while top and interior are covered with Duratex.

Pneumatic Load Suspension. Pneumatic Load Suspension. Motor Transport (Lond.), vol. 37, no. 964, Aug. 20, 1923, pp. 230–231, 3 figs. Body and freight converted into live load by simple air cushion system; wide application to all types of vehicles.

Schneider. The 15 Hp. TH. Schneider. Auto-Motor Jl., vol. 28, no. 34, Aug. 23, 1923, pp. 705–708, 12 figs. French car with engine of 85-mm. bore and 140-mm. stroke, four-cylindered; engine, clutch and gear, with self-starter and dynamo, comprise single unit.

Sizaire. A Car Without Axles. Autocar, vol. 51, no. 1457, Sept. 21, 1923, pp. 516–517, 5 figs. New two-liter Sizaire, in which much weight is greatly reduced and comfort ensured by original system of suspension.

Streamline. Comparative Trial Trips with the Jaray Streamline Automobile (Vergleichsfahrten mit dem Jaray-Stromlinienwagen), R. Conrad. Motorwagen, vol. 26, no. 23–24, Aug. 31, 1923, pp. 355–363, 11 figs. Results show economic advantages of Jaray car over standard-type automobiles.

Sunbeam. The Latest 16–40 Hp. Sunbeam. Autocar, vol. 51, no. 1455, Sept. 7, 1923, pp. 432–433, 4 figs. Mechanical improvements introduced in touring car.

Wolseley. The New Wolseley Programme. Autocar, vol. 51, no. 1453, Aug. 24, 1923, pp. 333–337, 13 figs. New 15-hp. chassis, new 10-hp. four-seater, and greatly extended range of coachwork of the 14-hp. chassis. Six distinct 1924 models ranging from two to six cylinders.

AVIATION

Aerial Navigation. Aerial Navigation, A. P. Rowe. Roy. Aeronautical Soc.—Jl., vol. 27, no. 153, Sept. 1923, pp. 450–458, 7 figs. Discusses art of navigating craft over (1) land unknown to navigator; land which is not capable of being mapped, e.g., desert; (3) large areas of water; (4) land or sea, but above clouds, such that pilot may take advantage of favorable weather conditions, or, in time of war, may proceed to his object of attack without interference.

Air-Line Requirements. Technical-Commercial Airplane Data (Estudio Técnico-Comercial del Avión), Luis Roque Pellizzari. Ingenieria, vol. 27, no. 8, Aug. 1923, pp. 356–362, 2 figs. Describes airplane service between Buenos Aires and Montevideo; types of airplanes suitable; data for calculating airplane details for given carrying capacity.

Development in U. S. Navy. The Development of Aviation in the Fleet, DeWitt C. Ramsay. U. S. Nav. Inst.—Proc., vol. 49, no. 9, Sept. 1923, pp. 1395–1417, 2 figs. Discusses military defensive and offensive potentialities inherent in certain types of aircraft, their limits of usefulness as auxiliaries to various types of naval surface vessels and suggested methods of their employment in naval warfare; deals with scouting, bombing, torpedo, observation and combat planes, kite balloons and rigid airships.

B

BEARING METALS

Babbitt. The Influence of the Ratio of Length to Diameter in the Compression Testing of Babbitt Metals, John R. Freeman, Jr. and Paul F. Brandt. Am. Soc. Testing Matls.—advance paper, no. 26, for meeting June 25–29, 1923, 7 pp., 3 figs. Investigation to determine influence of ratio of length to diameter in compression tests of babbitt metals.

High Lead Content. Bearing Metals with High Lead Content (Hochbleihaltige Lagermetalle), G. v. Hanffstengel. Giesserei-Zeitung, vol. 20, no. 18, Aug. 15, 1923, pp. 344–345, 4 figs. Properties and use of such alloys; hardening of lead with light metals; thermit bearing metal; behavior of bearing metals in practice.

BEARINGS, BALL

Manufacture. Ball Bearings and How They Are Made, Robert G. Skerrett. Sci. Am., vol. 129, no. 5, Nov. 1923, pp. 330–331 and 375, 8 figs. Describes equipment and process of manufacture.

BELTING

Leather. A New Type of "V" Leather Belt. Power Engr., vol. 18, no. 210, Sept. 1923, pp. 331–332, 2 figs. Salient features and advantages of Brammer belting, constructed on fish-scale principle, comprising separate leather links varying from 3 to 5 in. in length.

Making Leather Belts Endless, Louis W. Arny. Power Plant Engr., vol. 27, no. 19, Oct. 1, 1923, pp. 977–981, 11 figs. Tools required; making laps, classes of belts to be made endless; making new belts endless; waterproofing belting cement; lubrication.

BENDING

Theory of. The Theory of Bending, William Hovgaard. Engineering, vol. 116, no. 3015, Oct. 12, 1923,

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 166

Bushings, Bronze
* Wood's, T. B. Sons Co.

Cabinets and Tables, Blue Print Filing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
Manufacturing Equip. & Engrg. Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Cableways, Excavating
Lidgerwood Mfg. Co.

Cableways, Hoisting and Conveying
Lidgerwood Mfg. Co.

Calorimeters
* American Schaeffer & Budenberg Corp'n
* Sarco Co. (Inc.)

Cars, Charging
* Whiting Corp'n

Cars, Industrial Railway
Link-Belt Co.
* Whiting Corp'n

Cars, Trolley (Industrial Railway)
Link-Belt Co.

Casehardening
* American Metal Treatment Co.

Casings, Steel (Boiler)
* Brownell Co.
* Casey-Hedges Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Castings, Acid Resistant
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Aluminum
DuPont Engineering Co.

Castings, Brass
* Croll-Reynolds Engineering Co.
Du Pont Engineering Co.
* Edward Valve & Mfg. Co.

Castings, Die-Molded
* Doehler Die-Casting Co.
Veeder Mfg. Co.

Castings, Heavy
* U. S. Cast Iron Pipe & Fdry. Co.

Castings, Iron
* Brown, A. & F. Co.
* Builders Iron Foundry
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Central Foundry Co.
Chain Belt Co.
* Cole, R. D. Mfg. Co.
* Croll-Reynolds Engineering Co.
DuPont Engineering Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* Fuller-Lehigh Co.
* Harrisburg Fdry. & Mach. Wks.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Royersford Fdry. & Mach. Co.
Treadwell Engineering Co.
* U. S. Cast Iron Pipe & Fdry. Co.
* Vogt, Henry Machine Co.

Castings, Monel Metal
Driver-Harris Co. (in Canada)
* Edward Valve & Mfg. Co.

Castings, Nichrome
Driver-Harris Co.

Castings, Semi-Steel
* Builders Iron Foundry
Chain Belt Co.
* Croll-Reynolds Engrg. Co. (Inc.)
Link-Belt Co.
* Nordberg Mfg. Co.
* Vogt, Henry Machine Co.

Castings, Steel
* Falk Corporation
Link-Belt Co.
Mackintosh-Hemphill Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
Treadwell Engineering Co.

Castings, White Metal
* Doehler Die-Casting Co.

Cement, Iron and Steel
Smooth-On Mfg. Co.

Cement, Pipe Joint
Smooth-On Mfg. Co.

Cement, Refractory
* Celite Products Co
Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Cement, Water-Resistant
Smooth-On Mfg. Co.

Cement Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Centrifugals, Chemical
Tolhurst Machine Works

Centrifugals, Metal Drying
Tolhurst Machine Works

Centrifugals, Sugar
Tolhurst Machine Works
* Worthington Pump & Mchry. Corp'n

Chain Belts and Links
Chain Belt Co.
* Diamond Chain & Mfg. Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Chains, Block
Reading Chain & Block Corp'n

Chains, Crane
Reading Chain & Block Corp'n

Chains, Power Transmission
Baldwin Chain & Mfg. Co
Chain Belt Co.
* Diamond Chain & Mfg. Co.
Link-Belt Co.
* Morse Chain Co.
Union Chain & Mfg. Co.
* Whitney Mfg. Co.

Charging Machines
* Whiting Corp'n

Chimneys, Brick (Radial)
Heine Chimney Co.
Morrison Boiler Co.

Chimneys, Concrete
Heine Chimney Co.

Chucking Machines
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Chucks, Drill
* S K F Industries (Inc.)
* Whitney Mfg. Co.

Chucks, Tapping
* Whitney Mfg. Co.

Chutes
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Cigar Making Machinery
* American Machine & Foundry Co.

Cigarette Making Machinery
* American Machine & Foundry Co.

Circuit Breakers
* General Electric Co.

Circulators, Feed Water
* Schutte & Koerting Co.

Circulators, Steam Heating
* Schutte & Koerting Co.

Cloth, Rubber
* Goodrich, B. F. Rubber Co.

Cloth, Tracing
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Clutches, Friction
* Allis-Chalmers Mfg. Co.
* Brown A. & F. Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
Philadelphia Gear Works
* Western Engineering & Mfg. Co.
* Wood's, T. B. Sons Co.

Coal
Pennsylvania Coal & Coke Co.

Coal Agitators
Ellis, W. E. Co.

Coal and Ash Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Coal Bins
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Coal Mine Equipment and Supplies
* General Electric Co.

Coal Mining Machinery
* General Electric Co.
* Ingersoll-Rand Co.

Coaling Stations, Locomotive
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Coating (Metal Protecting)
* American Machine & Foundry Co.

Cocks, Air and Gage
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crane Co.
* Jenkins Bros.
Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Vogt, Henry Machine Co.

Cocks, Blow-off
* Crane Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Cocks, Three-Way and Four-Way
* American Schaeffer & Budenberg Corp'n
* Crane Co.
* Crosby Steam Gage & Valve Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)

Coils, Pipe
* Superheater Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Coke
Pennsylvania Coal & Coke Co.

Cold Storage Plants
* De La Vergne Machine Co.

Collars, Shafting
Chain Belt Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Coloring (Metal)
* American Metal Treatment Co.

Combustion (CO_2) Recorders
* Sarco Co. (Inc.)
* Tagliabue, C. J. Mfg. Co.
* Uehling Instrument Co.

Compressors, Air
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.
* Wayne Tank & Pump Co.
* Worthington Pump & Machinery Corp'n

Compressors, Air, Centrifugal
* De Laval Steam Turbine Co.
* General Electric Co.

Compressors, Air, Compound
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Compressors, Ammonia
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Compressors, Gas
* De Laval Steam Turbine Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Ammonia
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Condensers, Barometric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* U. S. Cast Iron Pipe & Fdry. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Jet
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Condensers, Surface
* Allis-Chalmers Mfg. Co.
Elliott Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Condenser & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Conduits
Johns-Manville (Inc.)

Controllers, Automatic, for Temperature or for Pressure
(See Regulators)

Controllers, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Controllers, Filter Rate
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Controllers, Liquid Level
* Davis, G. M. Regulator Co.
* General Electric Co.
* Simplex Valve & Meter Co.
* Tagliabue, C. J. Mfg. Co.

Converters, Steel
* Whiting Corporation

Converters, Synchronous
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyor Systems, Pneumatic
* Allington & Curtis Mfg. Co.
* Sturtevant, B. F. Co.

Conveyors, Belt
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Bucket, Pan or Apron
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Conveyors, Chain
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Conveyors, Ice
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Conveyors, Portable
Link-Belt Co.

Conveyors, Screw
Chain Belt Co.
* Gifford-Wood Co.
Link-Belt Co.

Cooling Ponds, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Cooling Towers
* Burhorn, Edwin Co.
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Copper, Drawn
* Roebling's, John A. Sons Co.

Copper Converting Machinery
* Allis-Chalmers Mfg. Co.
* Worthington Pump & Machinery Corp'n

Counters, Revolution
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Veeder Mfg. Co.

Countershafts
* Builders Iron Foundry
* Wood's, T. B. Sons Co.

Couplings, Pipe
* Central Foundry Co.
* Crane Co.
Lunkenheimer Co.

Coupling, Shaft (Flexible)
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

pp. 478–480, 3 figs. Investigation led to what is believed to be new and fundamental proof of essential soundness of theory, justifying its extension to beams of non-homogeneous materials.

BENZOL

Motor. Comparative Engine Tests with Crude, Acid Refined, and Silica-Gel Refined Motor Benzol, A. C. Fieldner and G. W. Jones. U. S. Bur. of Mines—Reports of Investigations, no. 2517, Aug. 1923, 3 pp. Investigation to determine possibility of using silica-gel as refining agent for motor benzol, and especially possibility of removing sulphur compounds and gum-forming constituents by such treatment.

BLAST FURNACES

Fuels for. Tests with Different Fuels in the Blast-Furnace Plant of Böhler Bros. & Co., in Vordernberg (Germany) (Ueber Versuche mit verschiedenen Brennstoffen bei der Hochofenanlage der Gebruder Böhler & Co., A.-G., in Vordernberg). Stahl u. Eisen, vol. 43, no. 38, Sept. 26, 1923, pp. 1215–1219, 2 figs. Difficulties in production of charcoal pig iron; combustion velocity of different blast-furnace fuels; practical experiences with mixed fuels.

BLOWERS

Converter. Blowers for Large and Small Converters (Gebläse für Gross- und Kleinkonverter), Hubert Hermann. Giesserei-Zeitung, vol. 20, no. 19, Sept. 1, 1923, pp. 371–373, 4 figs. Comparison of burning in shaft furnaces and in iron baths; requirements of converters; drive of small blowers.

BOILER FEEDWATER

Circuits. Boiler Feed Water Circuits, James G. Weir, Power Engr., vol. 18, no. 211, Oct. 1923, pp. 381–381, 12 figs. Discusses three possible sources from which water can absorb impurity, namely, condenser leakage, make-up supply, and absorption of air and other gases in feed reservoir. See also Engineer, vol. 136, no. 3536, Oct. 5, 1923, pp. 372–374, 15 figs.

Regulators. Feed Water Regulators. Eng. Rev. & Trader, vol. 37, no. 2, Aug. 1923, pp. 31–32, 3 figs. Describes thermofeed water regulator, consisting of float chamber and automatic regulating valve.

The Mercon Regulator. Power, vol. 58, no. 16, Oct. 16, 1923, p. 602, 3 figs. Excess-pressure regulator for both steam- and motor-driven boiler-feed pumps designed to maintain constant differential.

Treatment. Purification of Feedwater by the Kestner Method (Rening av matarvatten enligit Kestners metoder), Torsten Samson. Teknisk Tidskrift, vol. 53, nos. 11 and 16, Mar. 17 and Apr. 21, 1923, pp. (Mekanik) 31–34 and 42–44, 16 figs. Describes Kestner method depending on precipitation of calcium sulphate and magnesium chloride by means of soda; describes, as example, water softening in a plant of five boilers, each producing 24,000 kg. steam per hour at 20 atmos.

BOILER FURNACES

Air Preheating. Ljungström Air Heater (Le rechauffeur d'air Ljungstrom). Génie Civil, vol. 83, no. 10, Sept. 8, 1923, pp. 232–234, 7 figs. Preheating of air, using heat of flue gases, advantages; describes preheating plant at Holmens Bruks works in Sweden.

Flue-Dust Removal. Flue-Dust Removal by Suction (Saugluft-Flugaschenförderung), Rich. Baumann. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 39–40, Sept. 29, 1923, pp. 954–955, 7 figs. Describes method according to which red-hot ashes are removed from boilers while in operation, then cooled and, by mixing with water, changed into easily handled sludge; cleanliness and economy of process.

Oil-Fired. Furnace Setting for Oil-Fired Boilers, George C. Adams. Power, vol. 58, no. 14, Oct. 2, 1923, pp. 531–532, 1 fig. Describes furnace composed of two important parts, air spacing and vacuum pit; air spacing is composed of standard arch bricks set on large side.

Pulverized-Coal-Burning. Burning Pulverized Coal in the Cannon Radiating Furnace, H. B. Cannon. Combustion, vol. 9, no. 4, Oct. 1923, pp. 307–311, 4 figs. New type of boiler furnace designed to operate with pulverized fuel, in which combustion rate many times in excess of rate recommended at present has been maintained.

Smokeless Combustion. Smokeless Combustion in Boiler Furnaces, R. C. Demary. Combustion, vol. 9, no. 4, Oct. 1923, pp. 323–324. Points out importance of analysis of flue gases or proper draft.

BOILER OPERATION

Control. Modern Systems of Boiler Control, John B. C. Kershaw. Combustion, vol. 9, no. 3, Sept. 1923, pp. 232–239, 7 figs. Savings effected by use of testing instruments in boiler houses; bonus systems of control; application of control systems in different plants in Great Britain.

BOILER PLANTS

Efficiency, Improvement of. Building up Efficiency in Small Boiler Plants, R. C. Demary. Power Plant Eng., vol. 27, no. 20, Oct. 15, 1923, pp. 1020–1022, 2 figs. Notes on boiler settings, and boiler-room instruments.

Methods and Equipment Employed in Increasing the Economy of the Light and Power Plant in the Krupp-Grusonwerk, Magdeburg (Arbeiten und Einrichtungen zur Hebung der Wirtschaftlichkeit des Licht- und Kraftwerkes im Krupp-Grusonwerk, Magdeburg), H. Zimmermann. Wärme, vol. 46, no. 31, Aug. 3, 1923, pp. 339–341. Fluctuations in load; enlargement of draft; reconstruction of furnaces; no-load losses; turbo-generator as phase displacer; measuring station and control of operation.

Heat Balance. The Calculation of Heat Balances of Boiler Plant, Chas. F. Wade. Elec. Rev., vol. 93, no. 2388, Aug. 31, 1923, pp. 309–310. Laboratory data and further information needed as basis for calculation.

Management. Power Plant Management, Robert June. Blast Furnace & Steel Plant, vol. 11, no. 10, Oct. 1923, pp. 546–550, 4 figs. Efficient combustion practice; combustion losses and how to minimize them.

BOILER TUBES

Cleaning Blower. The "Parry" Boiler Tube Cleaning Blower. Engineer, vol. 136, no. 3535, Sept. 28, 1923, p. 350, 5 figs. Combination of De Laval steam nozzle with deflecting nozzle fitted with accurately machined guide vanes, which is mounted in boiler in such manner that it commands all tubes.

BOILERS

Locomotive. See LOCOMOTIVE BOILERS.

Waste-Heat. Boilers with Large Water Space and Waste-Heat Boilers (Grosswasserraum- und Abhitzekessel in der neueren Wärmetechnik), Friedrich Schulte. Wärme, vol. 46, nos. 34 and 35, Aug. 24 and 31, 1923, pp. 373–377 and 387–391, 11 figs. Recent investigations and conclusions and their application to steam boilers; utilization of radiation and contact heat; size of furnace and of radiated-heating surfaces in flue and other boilers; application of laws of heat transmission to waste-heat boilers of different types; elimination of air from boiler feed-water.

Water Gages. The Pneumercator Distant-Reading Boiler Water-Gauge. Engineering, vol. 116, no. 3015, Oct. 12, 1923, pp. 460–461, 6 figs. Describes gage which works with cold water, which is distinct advantage over gages in which glasses are subject to temperature of steam; can be placed in practically any position where it is most convenient for observation.

BOILERS, WATER-TUBE

Vertical. Vertical Water-tube Boilers, F. Johnstone-Taylor. Colliery Guardian, vol. 126, no. 3274, Sept. 28, 1923, pp. 773–775, 9 figs. Notes on their construction and advantages.

BRAKES

Compound Lever to Increase Power. Increased Brake Power for Passenger and Freight Vehicles. Ry. Engr., vol. 44, no. 524, Sept. 1923, pp. 340–341 and 350, 3 figs. By use of compound lever described, increased vacuum brake power is obtained without additional or larger cylinders and increased hand brake power secured with present brake handles.

Kunze-Knorr. The Kunze-Knorr Brake for Goods Trains, Kurt Wiedemann. Eng. Progress, vol. 4, no. 7, July 1923, pp. 133–138, 14 figs. Non-automatic single-chamber air brake; double-chamber air brake; change-over freight-train and passenger-train brake; Kunze-Knorr freight-train brake; braking performance; results of experience.

Passenger-Train. Universal Brake Control and Other Types of Brakes. Ry. & Locomotive Eng., vol. 36, no. 10, Oct. 1923, pp. 329–331, 1 fig. (Abstract.) Report to Traveling Engrs.' Assn.

BRAKING

Regenerative. The Compound Characteristic in Regenerative Braking with Direct-Current Traction, M. G. Say and H. G. Frampton. Instn. Elec. Engrs.—Jl., vol. 61, no. 321, Aug. 1923, pp. 863–868, 10 figs. Deals with particular form of regenerative braking for d.c. trains, effected by application of differential compound field excitation to traction motors.

BRASS

Hardness. The Hardness of "Common High" Sheet Brass, Alvan L. Davis. Am. Soc. for Steel Treating, vol. 4, no. 3, Sept. 1923, pp. 348–352. Sets forth average hardness, as determined by various methods, and range in hardness to be expected in annealed and in hard-rolled sheet brass of various tempers.

BRONZES

Defective Castings. Defective Bronze Castings, Walter F. Buckley. Metal Industry (N. Y.), vol. 21, no. 9, Sept. 1923, p. 359. Explanation of various reasons responsible for their production in foundry and what should be done to minimize and prevent this condition.

BUSES

Trolley. Birmingham's Experiment with Trolley Omnibuses, Alfred Baker. Surveyor, vol. 64, no. 1650, Aug. 31, 1923, pp. 153–154, 1 fig. Reasons for adoption of new traction system in Birmingham, England, and description of equipment employed.

BUSHINGS

Bronze, Molding. Bronze Bushings, R. E. Search. Metal Industry (N. Y.), vol. 21, no. 9, Sept. 1923, pp. 356–357, 5 figs. Various methods of molding these castings. Translated and abstracted from Fonderie Moderne, Apr. 1923.

C

CABLEWAYS

Pipe Handling with. Aerial Conveying of Large Pipe for Pressure Conduits (Di un impianto di trasporto funicolare per la posa in opera di grosso tubi di condotta forzata), Michelini Mario. Ingegneria, vol. 2, no. 8, Aug. 1, 1923, pp. 211–216, 8 figs. Details of cableway construction executed by Ceretti and Tanfani in Milan for Hydroelectric Co. of Villeneuve and Borgofranco in Turin; calculations of power and machinery required.

CAR COUPLERS

Automatic. The Automatic Scharfenberg Coupling for Railway Cars, Gustav Laubenheimer. Eng. Progress, vol. 4, no. 7, July 1923, pp. 155–156, 11 figs. Rigid-type coupling without any locking device; coupling process; locking and disengaging of coupling advantages of Scharfenberg coupling.

CARBURETORS

Aircraft. Thermal Atomizing Carburetors (Les carburateurs à pulvérisation thermique). Aérophile, vol. 31, no. 13–14, July 1–15, 1923, pp. 212–213, 2 figs. Describes Le Grain carburetor adapted to aeronautical engines, designed to eliminate all dangers from back-fire of flame, and assuring complete atomizing of fuel.

CARS, COAL

Large German Types. Large Goods Cars for Mass Traffic, Gustav Laubenheimer. Eng. Progress, vol. 4, no. 7, July 1923, pp. 129–132, 9 figs. New German State railway uses freight cars with capacity of 50 tons of coal, or 40 tons of coke and automatic unloading device.

CARS, FREIGHT

Cast-Steel Underframe. One-Piece Cast Steel Freight Car Underframe. Ry. Rev., vol. 73, no. 13, Sept. 29, 1923, pp. 447–449, 6 figs. Southern Pacific standard double-sheathed box cars, equipped with cast-steel underframe, weigh 13.8 lb. per cu-ft. capacity.

Reinforced-Concrete. Freight Cars Made of Reinforced Concrete, H. Kleinlogel. Eng. Progress, vol. 4, no. 8, Aug. 1923, p. 164, 3 figs. Experiments and designs; reinforced-concrete cars heavier but cheaper than steel cars.

Truck-Frame Tests. Tests on Different Shaped Arch Bar Side Frames, Louis E. Ensley. Ry. Mech. Engr., vol. 97, no. 9, Sept. 1923, pp. 632–634, 8 figs. Slight changes in design reduce unit stresses from over 40,000 lb. to about 20,000 lb. See also Ry. Rev., vol. 73, no. 9, Sept. 1, 1923, pp. 303–306, 8 figs.

CARS, PASSENGER

Construction Methods. Modern Methods in Railway Carriage Building. Engineering, vol. 116, no. 3015, Oct. 12, 1923, pp. 467–469, 9 figs. partly on supp. plate. Construction methods at Derby works of London Midland & Scottish railway.

Steel. Suburban Car Featured by Low Unit Weight. Ry. Mech. Engr., vol. 97, no. 9, Sept. 1923, pp. 637–639, 8 figs. New Rock Island steel coach weighs only 920 lb. per seated passenger; special lighting equipment.

CARS, REFRIGERATOR

German. The Refrigerator Cars of the German Railways, G. Reder. Eng. Progress, vol. 4, no. 7, July 1923, pp. 146–147, 2 figs. Describes design and equipment of new German type, design of which is based on experience made in America.

CASE-HARDENING

Protection from Carburization. Protective Coatings for Selective Carburization, J. S. Vanick and H. K. Herschman. Am. Soc. for Steel Treating—Trans., vol. 4, no. 3, Sept. 1923, pp. 305–328, 8 figs. Results of experiments with coatings of copper plate and mineral base pastes, such as kaolin, fireclay and enamel mixtures in order to find effective protection of steel surfaces from carburization.

CAST IRON

Mass Effect. Studies Mass Effect on Iron, O. Smalley. Foundry, vol. 51, no. 20, Oct. 15, 1923, pp. 822–825, 4 figs. Tests made to determine chemical and physical phenomena occurring in cast iron as affected by rate of cooling; pouring temperature and rate of filling mold shown to be factors. (Abstract.) Paper read at Int. Foundrymen's Congress. See also Foundry Trade Jl., vol. 28, no. 370, Sept. 20, 1923, pp. 246–250, 9 figs.

Pearlitic. The Production, Strength Properties and Useful Possibilities of Pearlitic Cast Iron (Das Perlitgusseisen, seine Herstellung, Festigkeitseigenschaften und Anwendungsmöglichkeiten), O. Bauer. Giesserei-Zietung, vol. 20, no. 17, Aug. 1, 1923, pp 317–324, 10 figs. Conditions for production of pearlitic castings; tests to determine properties of pearlitic cast iron; its superiority over other kinds of cast iron; uses.

Specifications. Topical Discussion: Is It Desirable to Include Chemical Requirements in Specifications for Cast Iron? Am. Soc. Testing Matls.—advance paper, no. 23, for meeting June 25–29, 1923, 6 pp. Argument for affirmative, by Robert Job; argument for negative, by Richard Moldenke.

Testing. Testing Cast-Iron, Richard Moldenke. Foundry Trade Jl., vol. 28, no. 369, Sept. 13, 1923, pp. 224–226. Present position; Fremont test; early methods; separately cast test bars; advent of arbitration bar; necessity for universal bar; ring test; flat and round test bars; criticism of arbitration bar; diameter and machining of test bars; position of casting, etc. Report to Int. Foundrymen's Convention at Paris, France.

The Mechanical Testing of Cast Iron, H. H. Shepherd. Metal Industry (Lond.), vol. 23, nos. 9, 11, 12 and 13, Aug. 31, Sept. 14, 21 and 28, 1923, pp. 171–172, 223–225, 251–253 and 275–277, 7 figs. Reviews and criticizes various methods used for mechanical testing.

CASTING

Centrifugal. Centrifugal Casting Process. Machy. (Lond.), vol. 22, no. 569, Aug. 23, 1923, pp. 653–

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 166

* Falk Corporation
* Fawcus Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
* Medart Co.
* Nordberg Mfg. Co.
* Smith & Serrell

Coupling, Shaft (Rigid)
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
Chain Belt Co.
Cumberland Steel Co.
* Falls Clutch & Machinery Co.
* General Electric Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Smith & Serrell
* Wood's, T. B. Sons Co.

Couplings, Universal Joint
* Wood's, T. B. Sons Co.

Coverings, Steam Pipe
Johns-Manville (Inc.)

Cranes, Electric Traveling
Northern Engineering Works
* Whiting Corporation

Cranes, Floor (Portable)
Lidgerwood Mfg. Co.

Cranes, Gantry
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Works
* Whiting Corp'n

Cranes, Hand Power
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Northern Engineering Works
* Whiting Corp'n

Cranes, Jib
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Whiting Corp'n

Cranes, Locomotive
* Brown Hoisting Machinery Co.
Link-Belt Co.
* Whiting Corp'n

Cranes, Locomotive (Crawler)
Link-Belt Co.

Cranes, Pillar
* Brown Hoisting Machinery Co.
Northern Engineering Works
* Whiting Corp'n

Cranes, Portable
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
Link-Belt Co.

Crucibles, Graphite
Dixon, Joseph Crucible Co.

Crushers, Coal
* Allis-Chalmers Mfg. Co.
* Brown Hoisting Machinery Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Crushers, Jaw
* Worthington Pump & Machinery Corp'n

Crushers, Ore and Rock
* Nordberg Mfg. Co.

Crushers, Roll
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

Crushing and Grinding Machinery
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corpn'

Cupolas
* Bigelow Co.
Northern Engineering Works
* Whiting Corp'n

Cutters, Bolt
* Landis Machine Co. (Inc.)

Cutters, Milling
* Whitney Mfg. Co.

Dehumidifying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n

Derricks and Derrick Fittings
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Diaphragms, Rubber
* United States Rubber Co.

Die Castings
(See Castings, Die Molded)

Die Heads, Thread Cutting (Self-opening)
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Dies, Punching
* Niagara Machine & Tool Works

Dies, Sheet Metal Working
* Niagara Machine & Tool Works

Dies, Stamping
* Niagara Machine & Tool Works

Dies, Thread Cutting
* Curtis & Curtis Co.
* Jones & Lamson Machine Co.
* Landis Machine Co. (Inc.)

Diesel Engines
(See Engines, Oil, Diesel)

Digesters
* Bigelow Co.

Distilling Apparatus
* Vogt, Henry Machine Co.

Doors, Sidewalk Elevator (Automatic Safety)
* Gillis & Geoghegan

Drafting Room Furniture
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Drawing Instruments and Materials
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Dredges, Hydraulic
* Morris Machine Works

Dredging Machinery
Lidgerwood Mfg. Co.
* Morris Machine Works

Dredging Sleeve
* United States Rubber Co.

Drilling Machines, Sensitive
* Royersford Fdry. & Mach. Co.

Drilling Machines, Vertical
* Royersford Fdry. & Mach. Co.

Drills, Coal and Slate
* General Electric Co.
* Ingersoll-Rand Co.

Drills, Core
* Ingersoll-Rand Co.

Drills, Rock
* General Electric Co.
* Ingersoll-Rand Co.

Drinking Fountains, Sanitary
Johns-Manville (Inc.)
Manufacturing Equip. & Engrg. Co.

Dryers, Rotary
* Bigelow Co.
* Fuller-Lehigh Co.
Link-Belt Co.
* Sturtevant, B. F. Co.

Drying Apparatus
* American Blower Co.
* Carrier Engineering Corp'n
* Clarage Fan Co.
Philadelphia Drying Mchry. Co.
* Sturtevant, B. F. Co.

Dust Collecting Systems
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
* Clarage Fan Co.
* Sturtevant, B. F. Co.

Dust Collectors
* Allington & Curtis Mfg. Co.
* Allis-Chalmers Mfg. Co.
* Sturtevant, B. F. Co.

Dyeing Machinery
Philadelphia Drying Mchry. Co.

Dynamometers
* American Schaeffer & Budenberg Corp'n
* General Electric Co.
* Wheeler, C. H. Mfg. Co.

Economizers, Fuel
* Green Fuel Economizer Co.
* Sturtevant, B. F. Co.

Ejectors
* Schutte & Koerting Co.

Electrical Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Electrical Supplies
* General Electric Co.
Johns-Manville (Inc.)

Elevating and Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Elevators, Electric
* American Machine & Foundry Co.
Northern Engineering Works

Elevators, Hydraulic
* Whiting Corp'n

Elevators, Inclined
Otis Elevator Co.

Elevators, Passenger and Freight
Northern Engineering Works
Otis Elevator Co.

Elevators, Pneumatic
* Whiting Corp'n

Elevators, Portable
Link-Belt Co.

Elevators, Telescopic
Link-Belt Co.

Emery Wheel Dressers
* Builders Iron Foundry

Engine Repairs
* Franklin Machine Co.
* Nordberg Mfg. Co.

Engine Stops
* Schutte & Koerting Co.

Engines, Blowing
* Allis-Chalmers Mfg. Co.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Gas
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
Otto Engine Works
Sterling Engine Co.
* Titusville Iron Works Co.
* Westinghouse Electric & Mfg. Co.

Engines, Gasoline
Otto Engine Works
Sterling Engine Co.
* Sturtevant, B. F. Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Hoisting
* Allis-Chalmers Mfg. Co.
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Morris Machine Works
* Nordberg Mfg. Co.

Engines, Kerosene
* Worthington Pump & Machinery Corp'n

Engines, Marine
* Ingersoll-Rand Co.
Johnson, Carlyle Machine Co.
* Nordberg Mfg. Co.
Sterling Engine Co.
* Sturtevant, B. F. Co.
* Ward, Chas. Engineering Works
* Worthington Pump & Machinery Corp'n

Engines, Marine, Oil
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.

Engines, Marine, Steam
* Nordberg Mfg. Co.

Engines, Oil
* Allis-Chalmers Mfg. Co.
* De La Vergne Machine Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
Otto Engine Works
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Engines, Oil, Diesel
* Allis-Chalmers Mfg. Co.
* Nordberg Mfg. Co.
* Worthington Pump & Machinery Corp'n

Engines, Pumping
* Allis-Chalmers Mfg. Co.
* Ingersoll-Rand Co.
Luitwieler Pumping Engine Co.
* Morris Machine Works
* Nordberg Mfg. Co.
Sterling Engine Co.
* Worthington Pump & Machinery Corp'n

Engines, Steam
* Allis-Chalmers Mfg. Co.
* American Blower Co.
* Brownell Co.
* Clarage Fan Co.
Clyde Iron Works Sales Co.
* Cole, R. D. Mfg. Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
* Harrisburg Fdry. & Mach. Wks.
* Ingersoll-Rand Co.
* Leffel, James & Co.
Lidgerwood Mfg. Co.
Mackintosh-Hemphill Co.
* Morris Machine Works
* Nordberg Mfg. Co.
Ridgway Dynamo & Engine Co.
* Sturtevant, B. F. Co.
* Titusville Iron Works Co.
* Troy Engine & Machine Co.
* Vilter Mfg. Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Engines, Steam, Automatic
* American Blower Co.
* Brownell Co.
* Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
* Harrisburg Fdry. & Mach. Wks.
* Leffel, James & Co.
* Sturtevant, B. F. Co.
* Troy Engine & Machine Co.
* Westinghouse Electric & Mfg. Co.

Engines, Steam, Corliss
* Allis-Chalmers Mfg. Co.
* Franklin Machine Co.
* Frick Co. (Inc.)
* Harrisburg Fdry. & Mach. Wks.
Mackintosh-Hemphill Co.
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engine, Steam, High Speed
* American Blower Co.
* Brownell Co.
* Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Erie City Iron Works
* Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Poppet Valve
* Erie City Iron Works
* Nordberg Mfg. Co.
* Vilter Mfg. Co.

Engines, Steam, Throttling
* Brownell Co.
* Clarage Fan Co.
* Engberg's Electric & Mech. Wks.

Engines, Steam, Una-Flow
* Frick Co. (Inc.)
* Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.
Ridgway Dynamo & Engine Co.

Engines, Steam, Variable Speed
* Brownell Co.
* Harrisburg Fdry. & Mach. Wks.
* Nordberg Mfg. Co.

Engines, Steam, Vertical (Fully Enclosed, Self-Oiling)
* Clarage Fan Co.
* Engberg's Electric & Mech. Wks.
* Troy Engine & Machine Co.

Engines, Steering
Lidgerwood Mfg. Co.

Evaporators
* Croll-Reynolds Engrg. Co. (Inc.)
* Vogt, Henry Machine Co.

Excavating Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
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Exhaust Heads
Hoppes Mfg. Co.

Exhaust Systems
* Allington & Curtis Mfg. Co.
* American Blower Co.
* Clarage Fan Co.
* Sturtevant, B. F. Co.

Exhausters, Gas
* American Blower Co.
* Clarage Fan Co.
* General Electric Co.
* Green Fuel Economizer Co.
* Schutte & Koerting Co.
* Sturtevant, B. F. Co.

Extractors, Centrifugal
Tolhurst Machine Works

Extractors, Oil and Grease
* American Schaeffer & Budenberg Corp'n
* Kieley & Mueller (Inc.)

Factory Equipment, Metal
Manufacturing Equipment & Engrg. Co.

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* American Blower Co.
* Clarage Fan Co.
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* General Electric Co.
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* Sturtevant, B. F. Co.

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* Sturtevant, B. F. Co.

Feeders, Pulverized Fuel
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Filters, Air
Reed Air Filter Co. (Inc.)

Filters, Gravity
* Permutit Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

658, 9 figs. Machines and special melting plant used by Centrifugal Castings, Ltd., Kilmarnock.

Temperature Influence on Metals. The Influence of Casting Temperature on the Working Properties of Metals, T. B. L. Cain. Metal Industry (Lond.), vol. 23, no. 9, Aug. 31, 1923, pp. 165–166, 7 figs. Gives instances of profound influence excited by casting temperature.

CASTINGS

Cleaning. Machines and Methods for Cleaning Castings (Maschinen und Verfahren der Gussputzerei), W. Kaempfer. Zeit. des Vereines deutscher Ingenieure, vol. 67, nos. 35 and 36, Sept. 1 and 8, 1923, pp. 850–853 and 879–881, 31 figs. Comparison of sand blast and manual operations; free jet blasts; sand blasts with revolving tables; cleaning drums; handling of mass articles; dust absorption.

Small Defects in. Common Defects in Small Important Castings, S. G. Smith. Foundry, Trade Jl., vol. 28, nos. 364 and 366, Aug. 9 and 23, 1923, pp. 119–120 and 168, 4 figs. Outline of few of numerous small parts for engines which give trouble and dissatisfaction when passing through operations in machine shop.

CENTRAL STATIONS

By-Product Power from Steel Works for. Central-Station Utilization of By-product Power from Steel Plants, L. B. Breedlove. Elec. World, vol. 82, no. 15, Oct. 13, 1923, pp. 761–762, 1 fig. Opportunity for economical interchange of electrical energy and conservation of waste heat developed in steel industry; what data obtained from fully electrified plant show.

Gas-Engine-Driven. The Gas Engine Power Station of Palmers' Shipbuilding and Iron Company. Engineering, vol. 116, nos. 3007, 3010, 3012 and 3015, Aug. 17, Sept. 7, 21 and Oct. 12, 1923, pp. 195–198 and 208, 288–292, 364–366 and 368, and 454–457, 43 figs. partly on supp. plates. Installation made at Jarrow-on-Tyne yard (England); station contains seven vertical tandem gas engines of 1500 b.hp. and one of 1000 b.hp., each engine being direct-coupled to electric generator. Details of switchgear installation.

Germany. Hirschfelde Central Station (Das Grosskraftwerk Hirschfelde), Hanno Zeuner. Elektro-Journal, vol. 3, no. 8-9, Aug.-Sept. 1923, pp. 142–165, 36 figs. Describes superpower station at Hirschfelde, in Saxony, including mechanical and electrical equipment, linking-up of power stations in Saxony.

CHROME-NICKEL STEEL

Corrosion, Resistance to. Resistance to Corrosion of a Nickel-Chrome Steel (La résistance à la corrosion d'un acier au nickel-chrome), Robert Stumper. Revue de Métallurgie, vol. 20, no. 9, Sept. 1923, pp. 620–621. Results of tests with a steel of following composition: 0.54 Si, 0.012 P, 0.65 Mn, 0.6 C, 15.68 Cr, 7.04 Ni, exposed to action of hydrochloric acid, sulphuric acid, NaCl, steam, air, etc., showing excellent results.

CLUTCHES

Centrifugal. Centrifugal Clutches—II. Practical Engr., vol. 68, no. 1904, Aug. 23, 1923, pp. 103–104, figs. 12–17. Uses of centrifugal clutches; comparison of types.

COAL

Classification and Analyses. What Management Should Know of Coal, Robert June. Blast Furnace & Steel Plant, vol. 11, no. 9, Sept. 1923, pp. 495–499 and 503, 3 figs. Analytical summary of many elements entering into power production reduced to common basis for busy executive.

Direct Conversion to Electricity. Transforming Fuel Energy Directly Into Electric Energy [Problemet att direkt omvandla bränsleenergi till elektrisk (bränslecellen)], Gösta Angel. Teknisk Tidskrift, vol. 53, nos. 10 and 15, Mar. 10 and Apr. 14, 1923, pp. (Kemi) 13–16 and 17–20, 4 figs. By using coal as anode in Lalande battery, which is described in detail; describes gas battery with both electrodes consisting of gas, cathode connected with air, and anode with CO or other gas; concludes that at present direct transformation is impracticable.

Purchasing by Analysis. Propose Coal Buying by Analysis. Iron Trade Rev., vol. 73, no. 13, Sept. 27, 1923, p. 889. Southern Ohio Iron & Coke Assn. sponsors marketing plan in fuel similar to that in iron ore.

COAL HANDLING

Belt-Conveyor System. Coal Sorted, Stored and Transported by Belt-Conveyor System. Power, vol. 58, no. 16, Oct. 16, 1923, pp. 598–602, 7 figs. Fifty-ft. depth of coal storage is made possible by conveyor system, which may screen incoming coal, sending fine to power-house bunkers and coarser lumps to storage area; distributing crane performs number of functions in selecting and handling fuel; atomized water spray arrests coal dust.

Floating Plants. Floating Coal-Handling Plants at Continental Seaports, E. Krahnen. Iron & Coal Trades Rev., vol. 107, no. 2895, Aug. 24, 1923, p. 261. Floating steam slewing cranes for discharging and coaling steamers at Rotterdam; coal hoist for coaling steamers at Hamburg; coal hoist designed as colliers for coaling steamers.

Piers. The Electrically-Operated Coal Pier of the Western Maryland Railway Company, R. W. McNeill. Elec. Jl., vol. 20, no. 9, Sept. 1923, pp. 329–333, 8 figs. Equipment consists of stationary car dumper of lift and turnover type, with mechanical trimming apparatus for loading boats directly from dumper pan, and auxiliary conveying system to permit loading of boats on side of pier opposite that on which dumper pan is located.

COMBUSTION

CO at High Pressures. Gaseous Combustion at High Pressures, William A. Bone, Dudley M. Newitt, and Donald T. A. Townend. Roy. Soc.—Proc., vol. 103, no. A721, May 3, 1923, pp. 205–232, 12 figs. Energy-absorbing function and activation of nitrogen in combustion of carbon monoxide.

The Relative Influences of Water Vapor and Hydrogen upon the Explosion of Carbon Monoxide—Air Mixtures at High Pressures, William A. Bone, Dudley M. Newitt, and Donald T. A. Townend. Chem. Soc.—Jl., vol. 123-124, no. 730, Aug. 1923, pp. 2008–2021, 2 figs. Describes experiments which have led to belief that water vapor has smaller influence than hydrogen upon rate of pressure development in carbon monoxide-air experiments.

COMPRESSED AIR

Foundries. Possibilities of Saving by Use of Compressed Air in Foundries (Ersparnismöglichkeiten im Pressluftbetrieb in Giessereien), H. Kupper. Giesserei-Zeitung, vol. 20 no. 19, Sept. 1, 1923, pp. 374–377, 3 figs. Conditions for economic working of compressors; use of compressors for low and high pressure in foundries; arguments for introduction of unit air pressure; proper design of compressed-air containers; arrangement.

CONDENSERS, STEAM

Air Pumps for. Air Pumps for Surface Condensers (Beurteilung von Luftpumpen für Oberflächenkondensatoren), Paul H. Müller. Schiffbau, vol. 24, no. 46, Aug. 15, 1923, pp. 717–718, 1 fig. It is shown that water-jet apparatus as air pumps for surface-condensing plants are more saving of heat and more practical than steam-jet apparatus.

Records. Condenser Records Show Air Leaks, Tube Scale or Good Performance, S. Thomas. Power, vol. 58, no. 15, Oct. 9, 1923, pp. 565–566, 1 fig. Refers to method of calculating results and interpreting condenser records described in previous issue (Sept. 11), and shows how it is applied in practice to 16,000-sq. ft. condenser serving 8000-kw. turbine.

Tubes, Testing. Testing Marine Condenser Tubes. Machy. (Lond.), vol. 22, no. 571, Sept. 6, 1923, pp. 728–729, 5 figs. Methods adopted in engine shops of William Beardmore & Co., Dalmuir.

Vacuum, Estimation of. Effect of Changing Conditions on Vacuum in Surface Condensers. Mech. World, vol. 74, no. 1913, Aug. 31, 1923, pp. 129–130. Method of calculation; includes table of vacuum, with corresponding temperatures.

CONNECTING RODS

Forked, Strength of. The Strength of Forked Connecting Rods, William J. Kerton. Engineering, vol. 116, no. 3014, Oct. 5, 1923, pp. 442–444, 7 figs. Author seeks to derive more accurate method of calculating stresses in forked end of connecting rod, and to prove validity of his method by experimental evidence. Paper read before Brit. Assn.

High-Speed Engines. The Design of Connecting-Rods for High-Speed Engines, M. Platt. Automobile Engr., vol. 13, no. 180, Sept. 1923, pp. 279–285, 15 figs., and (appendices), 285–287, 6 figs. Presents numerous formulas for design of connecting rods of various cross sections.

CONVEYORS

Mail Handling. Van Buren Station, Chicago Post Office. Am. Architect, vol. 124, no. 2426, Aug. 15, 1923, pp. 171–175, 10 figs. Mechanical conveyor system installed to handle large tonnage of mail.

Pneumatic. Compressed-Air and Fan Pneumatic Conveyor (Ueber Luft und Lufterförderer), B. Buhle. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 36, Sept. 8, 1923, pp. 873–878, 35 figs. Fan-blast conveyor, in contrast to the usual suction and compressed-air conveyor, is described as an arrangement in which the air current is generated by a fan; describes types built by Seck Bros., Dresden, and Siemens-Schuckert Works, Berlin and results of tests.

Safety Regulations. Safety Regulations for Conveyors. Iron & Coal Trades Rev., vol. 107, no. 2893, Aug. 10, 1923, p. 191. Recommended by S. Wales Miners' Federation.

COPPER ALLOYS

Copper-Nickel-Lead. Copper-Nickel-Lead Alloys (Kupfer-Nickel-Bleilegierungen), W. Guertler and F. Menzel. Zeit. für Metallkunde, vol. 15, no. 8, Aug. 1923, pp. 223–224, 2 figs. Whereas copper and lead as well as nickel and lead do not mix in every condition, by mixing of all three metals, technically useful alloys of uniform structure are obtained.

Copper-Tin. Solidification and Transformation Curves of Copper-Tin Alloys (Das Erstarrungs- und Umwandlungsschaubild der Kupfer-Zinnlegierungen), O. Bauer and O. Vollenbruck. Zeit. für Metallkunde, vol. 15, nos. 5 and 7, May and July 1923, pp. 119–125 and 191–195, 6 figs. Composition and properties of mixed crystals; changes in CuSn compound; eutectic points; etc.

CORROSION

Alloys Resistant to. Alloys Resistant to Corrosion. Faraday Soc.—Trans., vol. 19, part 1, no. 55, July 1923. Contains following papers: General discussion, by Robert Robertson and C. H. Desch, pp. 156–158; The Corrosion of Industrial Metals, W. H. Hatfield, pp. 159–168, 1 fig.; The Resistance to Corrosion of Stainless Steel and Iron, J. H. G. Monypenny; pp. 169–183, 4 figs. Heat and Acid Resisting Alloys (Ni—Cr—Fe), J. Ferdinand Kayser, pp. 184–195, 6 figs.; Monel Metal, John Arnott, pp. 196–198; Corrosion Tests on Certain Nickel Alloys, F. Orme, pp. 199–200; Mechanism of So-Called "Dry Corrosion" of Metals, Ulick R. Evans, pp. 201–212; general discussion, pp. 213–230, 1 fig.

Iron and Steel. Report of Committee A-5 on Corrosion of Iron and Steel. Am. Soc. for Testing Matls.—advance paper, no. 11, for meeting June 25–29, 1923, 35 pp., 28 figs. Reports on inspection of Fort Sheridan, Pittsburgh and Annapolis tests; on total immersion tests; and on methods of sampling and analysis of metallic coated products.

Mechanism of. The Mechanism of Corrosion, John Johnston. Indus. & Eng. Chem., vol. 15, no. 9, Sept. 1923, pp. 904–905. Points out that more attention should be directed to what may be expected to happen at surface of separation, and formation and behavior of film or layer at metal surface under various conditions.

COST ACCOUNTING

Toy Industry. Charges and Costs in Toy Manufacture, Arthur Lazarus. Indus. Management (N. Y.), vol. 66, no. 4, Oct. 1923, pp. 243–246. Cost finding in highly seasonal industry.

CUTTING TOOLS

Stellite. Grinding and Inspecting Stellite Cutters, C. W. Metzger. Machy. (N. Y.), vol. 30, no. 2, Oct. 1923, pp. 125–127, 3 figs. Methods employed to obtain accurately ground stellite cutters of inserted-tooth type.

D

DIES

Combination Punches and. Combination Punches and Dies and Their Uses in Railroad Shops, Henry Otto. Ry. Jl., vol. 29, no. 9, Sept. 1923, pp. 26–28, 14 figs. Describes and illustrates articles made from scrap pieces of sheet steel and sheet copper.

Wire-Forming. Design of Wire-forming Dies, W. B. Greenleaf. Machy. (N. Y.), vol. 30, no. 2, Oct. 1923, pp. 96–97, 6 figs. Forming and twisting a loop; forming second loop and bend; final operations on file wire.

DIESEL ENGINES

Design. Modern Diesel Engines (Die Dieselmaschine der Gegenwart), H. Nägel. Zeit. des Vereines deutscher Ingenieure, vol. 67, nos. 28, 29, 30, 32 and 33, July 14, 21, 28, Aug. 11 and 18, 1923, pp. 677–685, 711–713, 725–735, 778–782 and 808–812, 128 figs. Review of development during past decade; constructional features of latest types by M. A. N., Deutz, Krupp, Sulzer, Deutsche Werke and Michel Motor companies; methods of eliminating air compressor, and latest experience in regard to use of heavy oils (of high ignition point); development of 2-stroke engines, with special reference to valve and port methods of admitting air for scavenging; solid injection without use of compressor, an economic necessity in small Diesel engines, and trend is towards elimination of compressors in large engines as well; use of residual oils of high boiling point said to offer economic advantages; Krupp "mushroom" piston, an important development; use of Diesel engines on locomotives, with special reference to use of Lentz hydraulic gear.

European Types. Europe Developing New Types of Diesel Engines. Mar. Eng. & Shipg. Age, vol. 28, no. 10, Oct. 1923, pp. 598–601, 9 figs. Manufacturers carrying out experimental work on double-acting, high-speed and compressorless types of engines.

M. A. N. German Two-Cycle Diesels. Gas & Oil Power, vol. 19, no. 217, Oct. 4, 1923, pp. 5–6, 3 figs. Features of 12,000-hp. 6-cylinder double-acting 2-cycle M. A. N. engine destroyed after Armistice.

Temperature Distribution and Heat Stresses. The Most Recent Investigations of Temperature and Heat Stresses in Internal-Combustion Engines (Die neuesten Forschungen über den Temperaturverlauf und die Wärmespannungen in Verbrennungsmotoren), H. Schmolke. Wärme, vol. 46, no. 30, July 27, 1923, pp. 327–330, 1 fig. Describes determination of periodical temperature oscillations in walls of Diesel engines, and method of calculation leading to determination of stationary temperature distribution and resulting heat stresses.

DRILLING MACHINES

Scientific Investigation. Drilling Machines (Bohrmaschinen), G. Schlesinger. Werkstattstechnik, vol. 17, nos. 14 and 15, July 15 and Aug. 1, 1923, pp. 417–447 and 449–480, 248 figs. Comparison of scientific calculation, measurement and practical design, based on study of drawings submitted by 17 German firms, all well-known makers of drilling machines. Deals with stresses occurring in drilling and their measurement; main drive of machine and its parts; screw-cutting arrangements; weight of machine in relation to power consumption and drilling pressure; shape and stress of supports or stands. Description of various types and makes.

DRILLS

Twist, Magnetic Analysis. Report of Committee A-8 on Magnetic Analysis. Am. Soc. Testing Matls.—advance paper, no. 13, for meeting June 25–29, 1923, 3 pp. Abstract of report on testing of twist drills.

DRYING

Methods and Apparatus. Industrial Drying—The Apparatus and How It Works, Lucien Buck. Chem. & Met. Eng., vol. 29, no. 14, Oct. 1, 1923, pp. 626–631, 4 figs. Notes on theory and design of driers, with examples from actual practices which show how drying problems are solved.

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Alphabetical List on page 166

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* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Vogt, Henry Machine Co.

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Kennedy Valve Mfg. Co.
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* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Vogt, Henry Machine Co.

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* Crane Co.
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Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Vogt, Henry Machine Co.

Flanges
* American Spiral Pipe Works
* Crane Co.
* Edward Valve & Mfg. Co.
Kennedy Valve Mfg. Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Reading Valve & Fittings Div.)
* Vogt, Henry Machine Co.

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* Crane Co.
* Jones, W. A. Fdry. & Mach. Co.
Kennedy Valve Mfg. Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Schutte & Koerting Co.
* Wood's, T. B. Sons Co.

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Forges
* Best, W. N. Corp'n

Forgings, Drop
* Vogt, Henry Machine Co.

Foundry Equipment
Northern Engineering Works
* Whiting Corp'n

Friction Clutches, Hoists, etc.
(See Clutches, Hoists, etc., Friction)

Friction Drives
Rockwood Mfg. Co.

Frictions, Paper and Iron
Link-Belt Co.
Rockwood Mfg. Co.

Fuel Economizers
(See Economizers, Fuel)

Furnace Construction
Furnace Engineering Co.

Furnaces, Annealing and Tempering
* Best, W. N. Corp'n
* General Electric Co.
* Kenworthy, Chas. F. (Inc.)
* Whiting Corp'n

Furnaces, Boiler
* American Engineering Co.
* American Spiral Pipe Wks.
* Babcock & Wilcox Co.
* Bernitz Furnace Appliance Co.
* Best, W. N. Corp'n
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.

Furnaces, Case Hardening
* Kenworthy, Chas. F. (Inc.)

Furnaces, Down Draft
* O'Brien, John Boiler Works Co.

Furnaces, Electric
Detroit Electric Furnace Co.
Engelhard, Chas. (Inc.)
* Kenworthy, Chas. F. (Inc.)

Furnaces, Forging
* Kenworthy, Chas. F. (Inc.)

Furnaces, Hardening
* Kenworthy, Chas. F. (Inc.)

Furnaces, Heat Treating
* Best, W. N. Corp'n
* General Electric Co.
* Kenworthy, Chas. F. (Inc.)

Furnaces, Melting
* Best, W. N. Corp'n
Detroit Electric Furnace Co.
* General Electric Co.
* Whiting Corp'n

Furnace, Non-Ferrous
Detroit Electric Furnace Co.

Furnaces, Non-Oxidizing
* Kenworthy, Chas. F. (Inc.)

Furnaces, Oil
Best, W. N. Corp'n

Furnaces, Smokeless
* American Engineering Co.
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
Herbert Boiler Co.
* Riley, Sanford Stoker Co.

Fuses
* General Electric Co.
Johns-Manville (Inc.)

Gage Boards
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gage Glasses
* American Schaeffer & Budenberg Corp'n

Gage Glasses, Inclined
Sesure Water Gauge Co.

Gage Testers
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gages, Altitudes
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gages, Ammonia
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.
* Vogt, Henry Machine Co.

Gages, Differential Pressure
* American Schaeffer & Budenberg Corp'n
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Tagliabue, C. J. Mfg. Co.
* Uehling Instrument Co.

Gages, Draft
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Hydraulic
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Crosby Steam Gage & Valve Co.

Gages, Liquid Level
* Bristol Co.
Lunkenheimer Co.
* Simplex Valve & Meter Co.

Gages, Loss of Head
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Measuring (Surface, Depth, Dial, etc.)
* Norma Co. of America

Gages, Pressure
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Tagliabue, C. J. Mfg. Co.
* Uehling Instrument Co.

Gages, Rate of Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* Simplex Valve & Meter Co.

Gages, Syphon
* Tagliabue, C. J. Mfg. Co.

Gages, Vacuum
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Bristol Co.
* Crosby Steam Gage & Valve Co.
* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.
* Uehling Instrument Co.

Gages, Water
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Bristol Co.
* Crane Co.
* Jenkins Bros.
Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.) (Pratt & Cady Division)
* Simplex Valve & Meter Co.

Gages, Water Level
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
Lunkenheimer Co.
* Simplex Valve & Meter Co.

Gas Holders
Improved Equipment Co.

Gas Plant Machinery
* Cole, R. D. Mfg. Co.
Improved Equipment Co.

Gas Plants
Improved Equipment Co.

Gas Washers
Improved Equipment Co.

Gaskets
* Goetze Gasket & Packing Co.
* Jenkins Bros.
Johns-Manville (Inc.)
* Sarco Co. (Inc.)

Gaskets, Iron, Corrugated
Smooth-On Mfg. Co.

Gaskets, Rubber
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Gasoline
Texas Co.
Tide Water Oil Sales Corp'n

Gates, Cut-off
Link-Belt Co.

Gates, Sluice
* Chapman Valve Mfg. Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Gear Cutting Machines
* Jones, W. A. Fdry. & Mach. Co.

Gear Hobbing Machines
* Jones, W. A. Fdry. & Mach. Co.

Gears, Cut
* Brown, A. & F. Co.
Chain Belt Co.
* De Laval Steam Turbine Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* James, D. O. Mfg. Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
Mackintosh-Hemphill Co.
* Medart Co.
Northern Engineering Works
Philadelphia Gear Works
* Poole Engrg. & Mach. Co.

Gears, Fibre
* General Electric Co.
* James, D. O. Mfg. Co.

Gears, Herringbone
* Falk Corporation
* Fawcus Machine Co.

Gears, Machine Molded
* Brown, A. & F. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Gears, Rawhide
* James, D. O. Mfg. Co.
Philadelphia Gear Works

Gears, Speed Reduction
Chain Belt Co.
* De Laval Steam Turbine Co.
* Falk Corporation
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* General Electric Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
* Kerr Turbine Co.
Link-Belt Co.
* Poole Engrg. & Mach. Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Gears, Worm
Chain Belt Co.
* Cleveland Worm & Gear Co.
* Fawcus Machine Co.
* Foote Bros. Gear & Machine Co.
* Gifford-Wood Co.
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.

Generating Sets
* Allis-Chalmers Mfg. Co.
* American Blower Co.
* Clarage Fan Co.
* Coppus Engineering Corp'n
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Kerr Turbine Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Generators, Electric
* Allis-Chalmers Mfg. Co.
* De Laval Steam Turbine Co.
* Engberg's Electric & Mech. Wks.
* General Electric Co.
* Nordberg Mfg. Co.
Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Governors, Air Compressor
* Mason Regulator Co.

Governors, Engine, Oil
* Nordberg Mfg. Co.

Governors, Engine, Steam
* Nordberg Mfg. Co.

Governors, Oil Burner
* Mason Regulator Co.

Governors, Pressure
* Tagliabue, C. J. Mfg. Co.

Governors, Pump
* Bowser, S. F. & Co. (Inc.)
* Davis, C. M. Regulator Co.
* Edward Valve & Mfg. Co.
* Kieley & Mueller (Inc.)
* Mason Regulator Co.
* Tagliabue, C. J. Mfg. Co.

Governors, Water Wheel
* Worthington Pump & Machinery Corp'n

Granulators
* Smidth, F. L. & Co.

Graphite, Flake (Lubricating)
* Dixon, Joseph Crucible Co.

Grate Bars
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grate Bars (for Overfeed and Underfeed Stokers)
Furnace Engineering Co.

Grates, Dumping
* Brownell Co.
* Combustion Engineering Corp'n
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grates, Rocking
* Brownell Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

DURALUMIN

Resistance to Alternating Stresses. Resistance of Manganese Bronze, Duralumin, and Electron Metal to Alternating Stresses, R. R. Moore, Am. Soc. Testing Matls., advance paper, no. 24, for meeting June 25–29, 1923, 17 pp., 8 figs. Results of investigation made by Engineering Division of Air Service at McCook Field, to determine endurance limit of duralumin bar stock as rolled, annealed and tempered; similar investigations on manganese bronze and electron metal are included.

DYNAMICS

Stroud System of Teaching. The Stroud System of Teaching Dynamics, James B. Henderson. Engineering, vol. 116, no. 3013, Sept. 28, 1923, pp. 409–410. Describes results obtained with Stroud system; author seeks to show that system is more logical than any other in that all other systems become special cases, and also that Stroud's artifices are valuable aids to accuracy in laboratory and in engineering workshop. Paper read before Brit. Assn.

E

ECONOMIZERS

Cast-Iron. Feed Heaters or Fuel Economizers, Chas. E. Wade. Power Engr., vol. 18, no. 210, Sept. 1923, pp. 342–343, 1 fig. Outstanding facts relating to design, erection and operation of ordinary cast-iron type of economizer.

EDUCATION, ENGINEERING

American Industry and. Engineering Education and American Industry. Nat. Indus. Conference Board—Special Report, no. 25, Aug. 1923, 25 pp., 4 figs. Need for trained leadership in industry; educational problem; responsibility of industry.

EDUCATION, INDUSTRIAL

School Courses. The Educational Courses of the German Committee for Technical Instruction (Die Lehrgänge des Deutschen Ausschusses für Technisches Schulwesen), C. Matschoss. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 35, Sept. 1, 1923, pp. 845–849, 18 figs. Gives examples of instruction sheets for machine builders, locksmiths, patternmakers, molders, forgers, etc.; how courses originated; further developments and possibilities of application.

ELECTRIC DRIVE

Power-Plant Auxiliaries. The Drive of Power Station Auxiliaries, L. Breach and H. Midgley. Instn. Elec. Engrs.—Jl., vol. 61, no. 321, Aug. 1923, pp. 829–845 and (discussion) 845–862, 9 figs. Deals only with supply of power for auxiliaries of modern power station; consideration of different types of auxiliaries used in station; different types of supplies available; suitability of different auxiliaries and supplies for various conditions of station working.

ELECTRIC FURNACES

Brass Melting. Applying the Induction Furnace to an Industrial Brass Foundry, J. G. Crawford. Elec. World, vol. 82, no. 12, Sept. 22, 1923, pp. 586–588, 3 figs. Advantages of electric melting include economies in production, improved quality of poured metal, closer control of product and more favorable operating conditions; results of test run.

Current-Consumption Calculation. Calculation of Current Consumption in Electric Furnaces (Note sur le calcul des prises de courant dans les fours électriques), Alphonse Pasquier. Revue de Métallurgie, vol. 20, no. 9, Sept. 1923, pp. 591–596, 2 figs. Describes simple practical method of calculation applicable to metallic or carbon electrodes.

Fiat. New Design of Electric Furnaces. Eng. Progress, vol. 4, no. 8, Aug. 1923, pp. 169–170, 2 figs. Improvements; arrangement of electrodes; 3-phase transformer; advantages of Fiat furnace.

Induction. Theory of High-Tension Induction Furnaces (Théorie du four à induction à haute fréquence), G. Ribaud. Journal de Physique et le Radium, vol. 4, no. 6, June 1923, pp. 185–197, 2 figs. Calculation of what efficiency of this type of furnace should be, i.e., ratio between calorific energy accumulated in substance and electric energy taken from high-frequency source, and factors influencing this efficiency.

Metal Industry. Electric Furnaces in the Metal Industry (Der Ofen mit elektrischer Beheizung in der Metallindustrie), Wintermeyer. Elektro-Journal, vol. 3, no. 2, Feb. 1923, pp. 22–25, 7 figs. Reviews construction and operation of various types of arc and resistance furnaces; annealing and heating furnaces.

Non-Ferrous. Use of the Electric Furnace in Non-Ferrous Foundries and in Heat Treatment (L'emploi du four électrique en fonderie d'alliages et dans les traitements thermiques), M. Fourment. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 76, no. 4–5, Apr.-May 1923, pp. 446–467, 15 figs. partly on supp. plate. Principles of resistance, induction and arc furnaces, and their advantages in non-ferrous foundry work; comparison of various types of furnaces; construction of electric furnaces for heat treatment.

Steel. Giving Flexibility to Electric Furnace Design, Frank Hodson. Can. Machy., vol. 30, no. 10, Sept. 6, 1923, pp. 37–38, 3 figs. Steelmaking furnaces built for Ford Motor Co. plant, of 60 to 80-ton capacity, provided with 8 electrodes.

Progress in Manufacture of Steel in the Electric Furnace (Les progrès de la fabrication de l'acier au four électrique), Clausel de Coussergues. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 76, no. 4–5, Apr.-May 1923, pp. 423–445, 6 figs. on supp. plate. Describes different types of resistance or induction, arc radiation, and arc conduction furnaces, single-, two-, and three-phase; efficiency, heat losses, current consumption, etc.

ELECTRIC LOCOMOTIVES

Gasoline-Electric Switching. New Gasoline-Electric Switching Locomotive. Ry. Rev., vol. 73, no. 14, Oct. 6, 1923, pp. 488–489, 2 figs. Describes 40-ton unit constructed by Gen. Elec. Co., embodying improvements in design and construction over previous types.

Interurban Freight Service. Electric Locomotive for Interurban Freight Service. Elec. Ry. Jl., vol. 62, no. 10, Sept. 8, 1923, pp. 368–369, 2 figs. Field-control motors with forced ventilation give high continuous rating; locomotive will haul 1180 tons on level tangent truck.

Single-Phase. Single-Phase Express Locomotives, Type 1C1, With Individual Axle Drive, Built by Ateliers Sécheron for Swiss Federal Railways (Locomotives monophasées pour express, type 1C1, à commande individuelle des essieux, construites par les Ateliers de Sécheron pour les Chemins de fer fédéraux suisses), J. Werz. Génie Civil, vol. 83, no. 11, Sept. 15, 1923, pp. 241–245, 14 figs. partly on supp. plate. Describes design, electric equipment, and gives dimensions; results of trials; maximum speed 90 km. p. h.

Switching. Results in Switching Service With Storage-Battery Locomotives on the Austrian Federal Railway (Ergebnisse im Verschubdienst mit Akkumulatorlokomotive auf den Oesterreichischen Bundesbahnen), Robert Meixner and Adalbert Wachlowski. Elektrotechnische Zeit., vol. 44, nos. 33 and 34, Aug. 16 and 23, 1923, pp. 777–779 and 810–813, 2 figs. Efficiency of electric switching in general and with storage-battery locomotives in particular; profitableness of electric switching as compared with steam-locomotive switching.

ELECTRIC RAILWAYS

Cars, Side-Entrance. Door Lock for Side-Entrance Cars. Elec. Ry. Jl., vol. 62, no. 12, Sept. 22, 1923, pp. 447–449, 5 figs. Air-operated locks and indicators being installed on doors of Hudson & Manhattan railroad cars.

Length of Trains. Length of Trains for Electric Rapid Transit Service (Die Zuglänge elektrischer Stadtschnellbahnen), Renfert. Zentralblatt der Bauverwaltung, vol. 43, no. 65–66, Aug. 15, 1923, pp. 386–388, 8 figs. Data on length of trains in various capitals; discusses most economic length of trains for distance between two states, making calculations for distance of 600 m. with a starting acceleration of 0.7 m. per sec. per sec. and a braking deceleration of 1.0 m. per sec. per sec.

ELECTRIC WELDING

Development and Prospects. Electric Welder Vs. Riveter. Sci. Am., vol. 129, no. 4, Oct. 1923, pp. 236 and 295, 6 figs. Past successes and future promises of electric welding.

Tanks. The Application of Electric Welding to Large Tank Construction, E. J. Rigby. Am. Welding Soc.—Jl., vol. 2, no. 8, Aug. 1923, pp. 14–24, 5 figs. Describes methods adopted in repairing and constructing gasholders by Melbourne and Metropolitan Gas Co.

ELECTRIC WELDING, ARC

Corrosion, Effect on. The Metallographic Aspect of Arc Welded Joints, E. J. Rigby. Indus. Australian & Min. Standard, vol. 70, no. 1813, Aug. 30, 1923, pp. 328–330, 9 figs. Discusses effects of corrosion on welding, in connection with use of Quasi-Arc process of welding used in construction of gas holder in Melbourne.

EMPLOYEES

Educating in Fundamental Economics. Educating Workers in Fundamental Economics, Carl F. Dietz. Ry. Age, vol. 75, no. 14, Oct. 6, 1923, pp. 617–620, 1 fig. How to tell story clearly and in such a way that they can readily grasp it. (Abstract.) Address delivered before Chamber of Commerce.

EMPLOYMENT MANAGEMENT

White Motor Co. White Company Revises Shop Management, F. L. Prentiss. Iron Age, vol. 112, no. 15, Oct. 11, 1923, pp. 953–955. Bonus wage plan and other mechanisms adopted by truck manufacturer; personnel research department; provision for close touch with employees.

ENGINEERS

Chemical. The Aim and Function of the Chemical Engineer, W. H. Coleman. Chem. Age (Lond.), vol. 9, no. 219, Aug. 25, 1923, pp. 197–198. Points out essential function of chemical engineer, emphasizing importance of simplification of processes and insisting on factor of cost as well as of efficiency being taken into account.

ENGINEHOUSES

Repair Facilities, Improvements in. Improvement in Roundhouse Repair Facilities. Ry. Rev., vol. 73, no. 13, Sept. 29, 1923, pp. 453–455, 3 figs. Shows how installation of pillar cranes and drop pits, with which roundhouse on Southwestern railway system is equipped, can be applied to facilitate light and running repairs.

Turntable Tractors. Foolproof Tractors for Balanced Type Turntables. Ry. Elec. Engr., vol. 14, no. 9, Sept. 1923, pp. 279–281, 5 figs. Great Northern installs outfits which cannot be injured by adding weight or reversing motor.

EVAPORATORS

Prache & Bouillon. The Prache & Bouillon Evaporator. Power Engr., vol. 18, no. 210, Sept. 1923, pp. 346–347, 4 figs. Principle of and main method employed in evaporator as designed for provision of pure water for boiler plants.

F

FANS

Electrically Driven. Electric Drive for Centrifugal Fans, Blowers and Propeller Fans, Gordon Fox. Blast Furnace & Steel Plant, vol. 11, nos. 9 and 10, Sept. and Oct. 1923, pp. 469–471 and 530–532, 3 figs. Characteristics of fans operated at various percentages of rating with curves showing pressures, velocity heads, horsepower, etc.

Mine. High-Pressure Ventilating Fans, M. Mallécot Colliery Guardian, vol. 126, no. 3270, Aug. 31, 1923, p. 522, 2 figs. Examination of relative merits of two methods of ventilation.

Operation. Ventilation Problems, Walter S. Weeks. Eng. & Min. Jl.-Press, vol. 116, no. 10, Sept. 8, 1923, pp. 413–414, 4 figs. Discusses various factors in operation of fans.

FATIGUE

Industrial. Industrial Fatigue and Its Factors, C. E. A. Winslow. Forging—Stamping—Heat Treating, vol. 9, no. 9, Sept. 1923, pp. 380–381. Regulation of working day not only proves beneficial to employer but directly increases production; overheating of workroom affects efficiency.

FEEDWATER HEATERS

Locomotive. Locomotive Feed Water Heaters. Ry. & Locomotive Eng., vol. 38, no. 10, Oct. 1923, pp. 331–334. Closed-type and open-type heaters; exhaust-steam injector: tests; boiler checks; effect of bad water. Committee report to Traveling Engrs.' Assn.

FILES

Steel, Failure of. Some Causes for File Steel Failures, Arthur W. F. Green. Iron Age, vol. 112, no. 13, Sept. 27, 1923, pp. 811–815, 30 figs. Suggested means for prevention; conditions prevailing in rolling, forging and heat treatment of steel.

FIRE EXTINGUISHERS

Carbon Tetrachloride. Tests with Tetrachloride Extinguishers on Electric Fires, S. H. Katz, E. J. Gleim and J. J. Bloomfield. Fire & Water Eng., vol. 74, no. 10, Sept. 5, 1923, pp. 441–442 and 448–449, 2 figs. Effects produced under varying conditions; experiments on electric arcs; effects on human beings.

FIRE FIGHTING

High-Voltage-Wire Hazards. The Danger of High Voltage Wires in Fire Fighting, W. W. Stephen. Fire & Water Eng., vol. 74, no. 13, Sept. 26, 1923, pp. 635–636 and 653. Streams in vicinity of such heavily charged wires hazardous; heavy shocks received through streams on transformers.

FIRE PROTECTION

Well-Water System. A Novel Well Water Fire Protection System, H. C. Wetmore. Fire & Water Eng., vol. 74, no. 11, Sept. 12, 1923, pp. 505–506, 6 figs. How Key West, Fla., met puzzling situation; shallow salt wells supply water for fire pumpers; how wells are constructed.

FIREBRICK

Testing Insulating Value of. Testing the Comparative Insulating Value of Fire Brick, T. M. Caven. Combustion, vol. 9, no. 3, Sept. 1923, pp. 243–244. Description of simple method of making tests for thermal conductivity.

FLOW OF WATER

Pipes. An Experiment on the Flow of Water through a Circular Bend of Rectangular Section, Kazuo Kumabe. Soc. Mech. Engrs. Tokyo, Japan—Jl., vol. 26, no. 78, June 1923, pp. 49–67, 22 figs. on supp. plates. Distribution of pressure and velocity in circular bend of rectangular section of pipe. Value of experiment in regard to theory of water turbines having radial guide vanes.

FORGE SHOPS

Charger Manipulator. Forge Shop with Charger-Manipulator. Iron Age, vol. 112, no. 16, Oct. 18, 1923, pp. 1034–1036, 4 figs. Machine operates on turntable, with heating furnaces grouped radially about it; flexible heat-treating furnace a feature.

FOUNDRIES

American Practice. American Foundry Practice, Richard Moldenke. Foundry Trade Jl., vol. 28, no. 372, Oct. 4, 1923, pp. 283–284 and (discussion) 284–285. Notes on recruiting labor; Pittsburgh castings; nomenclature of semi-steel; cost systems, research work; sulphur in cast iron; pig iron by fracture and analyses; foundry coke; question of sand; safety-first considerations; coöperative research; testing cast iron. Paper before Inst. Brit. Foundrymen.

Brass vs. Iron. Brass vs. Iron Foundries, Charles F. Hopkins. Metal Industry (N. Y.), vol. 21, no. 9, Sept. 1923, pp. 351–355, 3 figs. Difference between ferrous and non-ferrous metals, care of crucibles and brass-foundry practice. (Abstract.) Address before Phila. Foundrymen's Assn.

Compressed-Air Economies. Compressed Air

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 166

Grates, Shaking
* Brownell Co.
* Casey-Hedges Co.
* Combustion Engineering Corp'n
* Erie City Iron Works
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.

Grease Cups
(See Oil and Grease Cups)

Grease Extractors
(See Separators, Oil)

Grease Guns, Reservoir Type
Carr Fastener Co.

Greases
* Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Tide Water Oil Sales Corp'n
Vacuum Oil Co.

Grinding Machinery
* Brown, A. & F. Co.
* Smidth, F. L. & Co.

Grinding Machines, Chaser
* Landis Machine Co. (Inc.)

Grinding Machines, Floor
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Grinding Machinery, Knife
* American Machine & Foundry Co.

Guards (Electric Lamp)
Flexible Steel Lacing Co.

Gun Metal Finish
* American Metal Treatment Co.

Hammers, Drop
* Franklin Machine Co.
* Long & Allstatter Co.

Hammers, Pneumatic
* Ingersoll-Rand Co.

Hangers, Shaft
* Brown, A. & F. Co.
* Chain Belt Co.
* Falls Clutch & Machinery Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Royersford Fdry. & Mach. Co.
* Wood's, T. B. Sons Co.

Hangers, Shaft (Ball Bearing)
* Hyatt Roller Bearing Co.
* S K F Industries (Inc.)

Hangers, Shaft (Roller Bearing)
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mach. Co.

Hard Rubber Products
* United States Rubber Co.

Hardening
* American Metal Treatment Co.

Heat Exchangers
* Croll-Reynolds Engineering Co.

Heat Treating
* American Metal Treatment Co.

Heaters, Feed Water (Closed)
* Brownell Co.
* Croll-Reynolds Engineering Co.
* Erie City Iron Works
* Schutte & Koerting Co.
* Walsh & Weidner Boiler Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Heaters, Feed Water, Locomotive (Open)
* Worthington Pump & Machinery Corp'n

Heaters, Water Supply
Herbert Boiler Co.

Heaters and Purifiers, Feed Water (Open)
* Brownell Co.
Elliott Co.
* Erie City Iron Works
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Springfield Boiler Co.
* Wickes Boiler Co.
* Worthington Pump & Machinery Corp'n

Heaters and Purifiers, Feed Water, Metering
* H. S. B. W.-Cochrane Corp'n

Heating and Ventilating Apparatus
* American Blower Co.
* American Radiator Co.
* Clarage Fan Co.
* Sturtevant, B. F. Co.

Heating Specialties
* Fulton Co.

Hoisting and Conveying Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
Clyde Iron Works Sales Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Northern Engineering Works

Hoists, Air
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
Northern Engineering Works
* Whiting Corp'n

Hoists, Belt
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Hoists, Chain
Northern Engineering Works
Reading Chain & Block Corp'n
* Yale & Towne Mfg. Co.

Hoists, Electric
* Allis-Chalmers Mfg. Co.
* American Engineering Co.
* Brown Hoisting Machinery Co.
Clyde Iron Works Sales Co.
* General Electric Co.
* Gillis & Geoghegan
Lidgerwood Mfg. Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Northern Engineering Works
Reading Chain & Block Corp'n
* Yale & Towne Mfg. Co.

Hoists, Gas and Gasoline
Lidgerwood Mfg. Co.

Hoists, Head Gate
Smith, S. Morgan Co.

Hoists, Hand Power
* Gillis & Geoghegan

Hoists, Locomotive & Coach
* Whiting Corp'n

Hoists, Mine
Lidgerwood Mfg. Co.
* Nordberg Mfg. Co.

Hoists, Skip
* Brown Hoisting Machinery Co.
Lidgerwood Mfg. Co.
Link-Belt Co.
Otis Elevator Co.

Hoists, Steam
(See Engines, Hoisting)

Hoists, Telescopic
* Gillis & Geoghegan

Holders, Nipple
* Curtis & Curtis Co.

Hose, Acid
* United States Rubber Co.

Hose, Air and Gas
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Hose, Fire
* United States Rubber Co.

Hose, Gas
* United States Rubber Co.

Hose, Gasoline
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Hose, Metal, Flexible
Johns-Manville (Inc.)

Hose, Oil
* United States Rubber Co.

Hose, Rubber
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Hose, Steam
* United States Rubber Co.

Hose, Suction
* United States Rubber Co.

Humidifiers
* American Blower Co.
* Carrier Engineering Corp'n
* Sturtevant, B. F. Co.

Humidity Control
* American Blower Co.
* Carrier Engineering Corp'n
* Sturtevant, B. F. Co.
* Tagliabue, C. J. Mfg. Co.

Hydrants, Fire
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Worthington Pump & Machinery Corp'n

Hydraulic Machinery
* Allis-Chalmers Mfg. Co.
* Ingersoll-Rand Co.
Mackintosh-Hemphill Co.
* Worthington Pump & Machinery Corp'n

Hydraulic Press Control Systems (Oil Pressure)
* American Fluid Motors Co.

Hydrokineters
* Schutte & Koerting Co.

Hydrometers
* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.

Hygrometers
* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.
Weber, F. Co. (Inc.)

Ice Making Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
Johns-Manville (Inc.)
* Nordberg Mfg. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

Ice Tools
* Gifford-Wood Co.

Idlers, Belt
* Smidth, F. L. & Co.

Indicator Posts
* Crane Co.
Kennedy Valve Mfg. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)

Indicators, CO
* Uehling Instrument Co.

Indicators, CO_2
Bacharach Industrial Instrument Co.
* Uehling Instrument Co.

Indicators, Engine
* American Schaeffer & Budenberg Corp'n
Bacharach Industrial Instrument Co.
* Crosby Steam Gage & Valve Co.

Indicators, Sight Flow
* Bowser, S. F. & Co. (Inc.)

Indicators, SO_2
* Uehling Instrument Co.

Indicators, Speed
* American Schaeffer & Budenberg Corp'n
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Injectors
* Schutte & Koerting Co.

Injectors, Air
* Croll-Reynolds Engrg. Co.

Instruments, Electrical Measuring
* General Electric Co.
* Taylor Instrument Cos.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Instruments, Oil Testing
* Tagliabue, C. J. Mfg. Co.

Instrument, Recording
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
Bacharach Industrial Instrument Co.
* Baily Meter Co.
* Bristol Co.
* Builders Iron Foundry
* Crosby Steam Gage & Valve Co.
Engelhard, Chas. (Inc.)
* General Electric Co.
* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.
* Uehling Instrument Co.
* Westinghouse Electric & Mfg. Co.

Instruments, Scientific
* Taylor Instrument Cos.
Weber, F. Co. (Inc.)

Instrument, Surveying
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Insulating Materials (Electrical)
* General Electric Co.
Johns-Manville (Inc.)

Insulating Materials (Heat and Cold)
* Celite Products Co.
Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* Quigley Furnace Specialties Co.

Irrigation Systems
* Spray Engineering Co.

Joints, Expansion
* Crane Co.
* Croll-Reynolds Engineering Co.
Hamilton Copper & Brass Works
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* United States Rubber Co.
* Wheeler, C. H. Mfg. Co.

Joints, Flanged Pipe
* Crane Co.
* Pittsburgh Valve, Fdry. & Const. Co.

Joints, Flexible
* Barco Mfg. Co.

Joints, Swing and Swivel
* Barco Mfg. Co.
Lunkenheimer Co.

Kerosene
Tide Water Oil Sales Corp'n

Kettles, Soda
Manufacturing Equipment & Engrg. Co.

Kettles, Steam Jacketed
* Cole, R. D. Mfg. Co.
* Nordberg Mfg. Co.
* Titusville Iron Works Co.

Keys, Machine
* Smith & Serrell
* Whitney Mfg. Co.

Keyseating Machines
* Whitney Mfg. Co.

Kilns, Dry (Brick, Lumber, Stone, etc.)
* American Blower Co.
* Sturtevant, B. F. Co.

Ladles
Northern Engineering Works
* Whiting Corp'n

Lamp Protectors
Flexible Steel Lacing Co.

Lamps, Incandescent
* General Electric Co.
Johns-Manville (Inc.)
* Westinghouse Electric & Mfg. Co.

Land-Clearing Machinery
Clyde Iron Works Sales Co.

Lathe Attachments, Pipe-Threading
* Curtis & Curtis Co.

Lathes, Automatic
* Jones & Lamson Machine Co.

Lathes, Brass
* Warner & Swasey Co.

Lathes, Chucking
* Jones & Lamson Machine Co.

Lathes, Engine
* Builders Iron Foundry

Lathes, Turret
* Jones & Lamson Machine Co.
* Warner & Swasey Co.

Levers, Flexible (Wire)
* Gwilliam Co.

Linings, Brake
Johns-Manville (Inc.)

Linings, Furnace
* Best, W. N. Corp'n
* Celite Products Co.
Johns-Manville (Inc.)
* King Refractories Co. (Inc.)
* McLeod & Henry Co.
* Quigley Furnace Specialties Co.

Linings, Stack
Johns-Manville (Inc.)

Liquid Fuel Equipment
* Best, W. N. Corp'n

Loaders, Portable
* Gifford-Wood Co.
Link-Belt Co.

Lockers, Metal
Manufacturing Equip. & Engrg. Co.

Locomotives, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Locomotives, Storage Battery
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Logging Machinery
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Lubricants
* Dixon, Joseph Crucible Co.
* Royersford Fdry. & Mach. Co.
Texas Co.
Tide Water Oil Sales Corp'n
Vacuum Oil Co.

Lubricating Systems
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Lubricators, Cylinder
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Lubricators, Force-Feed
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.

Lubricators, Hydrostatic
* Crosby Steam Gage & Valve Co.
Lunkenheimer Co.

Lubricators (Sight Feed)
* Crosby Steam Gage & Valve Co.
Lunkenheimer Co.

Machine Tool Feed Control Systems (Oil Pressure)
* American Fluid Motors Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

Economies in Foundries, H. Kupper. Metal Industry (Lond.), vol. 23, no. 14, Oct. 5, 1923, pp. 289–291, 3 figs. In author's opinion question of uniform pressure for foundries is becoming of progressively increasing importance, reasons for which are enumerated. Translated from Giesserei-Zeitung.

French Practice. Impressions of French Foundries. Metal Industry (Lond.), vol. 23, no. 13, Sept. 28, 1923, pp. 267–268. Comparison with foundry practice in America and England; no important difference in method employed; employment of female labor; molding and mixing machines.

Hamburg, Germany. The Iron Foundries of Greater Hamburg (Die Eisengiessereien Gross-Hamburgs), Gustav Wöhrn and Otto Friedheim. Giesserei-Zeitung, vol. 20, no. 18, Aug. 15, 1923, pp. 335–337, 4 figs. Account of most important foundries and their special products.

Modern Practice. Traces Trend in Steel Foundries, Edgar A. Custer. Iron Trade Rev., vol. 73, no. 15, Oct. 11, 1923, pp. 1028–1030. Green sand molds, rammed hard, becoming more widely used; rigid and accurately machined flasks and equipment; field pointed out for making castings in dry sand cores.

Protection of Workmen. The Protection of Foundry Workmen (Arbeiterschutz in Giessereien), A. Holverscheid. Stahl u. Eisen, vol. 43, nos. 30 and 36, July 26 and Sept. 6, 1923, pp. 968–975 and 1157–1162. Accidents liable to occur in sand dressing, molding, and with drying oven, in smelting and casting, cleaning of castings, etc.; treatment of injured.

Steel. Farington Steel Foundry (England) Iron & Coal Trades Rev., vol. 107, no. 2896, Aug. 31, 1923, pp. 291–292, 3 figs. Details of layout and equipment.

New Steel Jobbing Foundry. Iron Age, vol. 112, no. 14, Oct. 4, 1923, pp. 884–887, 6 figs. Plant of Eastern Steel Castings at Newark uses both acid open-hearth and electric furnaces; exceptional light conditions.

FOUNDRY EQUIPMENT

Sand-and-Oil-Mixing Machine. Sand and Oil Mixing Machine. Machy. (Lond.), vol. 22, no. 574, Sept. 27, 1923, pp. 826–827, 3 figs. New type of machine for mixing sand and oil as used in foundry core making.

FUELS

Anthracite Substitutes. Anthracite Substitutes, O. P. Hood. U. S. Bur. of Mines—Reports of Investigations, no. 2519, Aug. 1923, 4 pp. Discusses use of coke, bituminous coal, briquets, oil, and gas as substitutes. See also report on Fuels Available for Domestic Use as Substitutes for Anthracite Coal, Rudolf Kudlich in Report of Investigations, no. 2520, Aug. 1923, 7 pp.

Coal vs. Oil. Will It Pay to Burn Oil Instead of Coal? W. F. Schaphorst. Ry. Mech. Engr., vol. 97, no. 9, Sept. 1923, p. 624, 1 fig. Presents chart for determining relative value of coal and fuel oil.

Technology. Notes on Recent Developments in Fuel Technology, R. Wigginton. Fuel in Sci. & Practice, vol. 2, no. 8, Sept. 1923, pp. 247–248. New oil meter; examination of oils; coal gas; coal production; combustion of nitrogen; peat and dopplerite; fuel from ashes; industrial oxygen; new flame safety lamp.

Use and Abuse. Fuel—Its Use and Abuse, R. H. Fernald. Engrs. & Eng., vol. 40, no. 9, Sept. 1923, pp. 227–235 and (discussion) 235–239, 7 figs. Deals with resources and consumption in United States of solid, liquid and gaseous fuels; summary of suggestions for conservation of fuel.

[See also COAL; LIGNITE; OIL FUEL; PULVERIZED COAL.]

G

GAGES

Standardization. The Question of Gages in Germany and Abroad (Der Stand der Passungsfrage in Deutschland und im Auslande), K. Gramenz. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 25, June 23, 1923, pp. 605–612, 11 figs. Definition, classification, and standardization of gages in Germany, Austria, Holland, Sweden, England, United States and Russia.

GAS PRODUCERS

Ash-Fusion. Ash-Fusion Gas Producers (Il gasogeno a fusione delle ceneri), M. Servais. Metallurgia Italiana, vol. 15, no. 1, Jan. 1923, pp. 7–10. Experiments with gas producers with capacity for gasifying 200 tons in 24 hrs.; tables of data referred to 1 kg. of coke; heat balance, etc.

GASES

Mixtures, Pressures of. The Pressures of Gaseous Mixtures, Irvine Masson and L. G. F. Dolley. Roy. Soc.—Proc., vol. 103, no. A722, June 1, 1923, pp. 524–538, 2 figs. Results of investigations show that volume of mixture of argon and ethylene is usually markedly greater than sum of separate volumes, all being measured at one and same pressure (termed mixture pressure); at fixed molecular ratio (mass ratio), there is particular value of mixture pressure at which increase is greatest.

Specific Heats. Varying Specific Heats and Gas Engine Mixtures, Telford Petrie. Engineer, vol. 136, no. 3536, Oct. 5, 1923, pp. 361–362, 2 figs. Presents charts of specific heats at constant volume.

GASOLINE

Power-Producing Qualities. Preliminary Report of Power Producing Qualities of Certain Gasolines, Hugh M. Milton, Jr. Agricultural & Mech. College of Texas—Bul., vol. 8, no. 8, Aug. 1, 1922, 39 pp., 17 figs. Investigation of efficiency variations of four-cycle internal-combustion engine with different grades of petroleum products.

GEARS

Tooth Thickness, Measuring. Measuring Tooth Thickness of Involute Gears, Ernest Wildhaber. Am. Mach., vol. 59, no. 15, Oct. 11, 1923, pp. 551–552. New method which is not affected by errors in outside diameter; ordinary vernier caliper used; formula for standard measurement. See article by same author entitled: Measuring the Tooth Thickness of Helical Involute Gears, in same journal, no. 16, Oct. 18, 1923, pp. 587–588, 2 figs.

Variable-Speed. Shifting Speeds With An Oil Pump, P. J. Risdon. Sci. Am., vol. 129, no. 5, Nov. 1923, pp. 334 and 376, 4 figs. Details of British variable-speed gear without gear wheels.

GOVERNORS

Close Regulation. Close Regulation, H. W. Phillips. Power, vol. 58, no. 13, Sept. 25, 1923, pp. 495–498, 2 figs. Points out that close regulation may involve mechanical disadvantages in prime mover, a geared electric motor or a boiler-draft regulating device.

GRINDING

Disk. Reducing Costs by Disk Grinding, Charles O. Herb. Machy. (N. Y.), vol. 30, no. 2, Oct. 1923, pp. 109–112, 8 figs. Typical examples of work finished on disk-grinding machines.

GRINDING MACHINES

Face-Grinding. Face-Grinding Machines. Machy. (Lond.), vol. 22, no. 573, Sept. 20, 1923, pp. 789–792, 8 figs. Heavy-duty machines of double- and single-ended types.

Gear. Pratt & Whitney Gear Tooth Grinding Machine, Ellsworth Sheldon. Am. Mach., vol. 59, no. 15, Oct. 11, 1923, pp. 535–540, 10 figs. Faces of grinding wheels represent tooth profiles of rack; ingenious adaptation of mechanical movement; true generating machine.

GUN METAL

Casting Test Specimens. Methods of Casting Test Specimens of Gun Metal, E. H. Dix, Jr. Am. Soc. Testing Matls., advance paper, no. 25, for meeting June 25–29, 1923, 12 pp., 6 figs. Experience of McCook Field foundry in connection with casting test bars of gun metal.

H

HACK-SAWING MACHINES

Power. Power Hacksaws and their Efficiency, H. J. Swanson. Machy. (N. Y.), vol. 30, no. 2, Oct. 1923, pp. 121–124, 1 fig. Types of saw blades; cutting speeds; saw blades for different kinds of service; feeds or pressures on blade; determining time required for sawing.

HANDLING MATERIALS

Chemical Plants. Transport Facilities in Chemical Works, Herbert Blyth. Chem. Age. (Lond.), vol. 9, no. 219, Aug. 25, 1923, pp. 192–194, 3 figs. Describes facilities at works of United Alkali Co. at Widnes.

Problems. What Is Your Material Handling Problem? E. T. Spidy. Can. Ry. Club—Official Proc., vol. 22, no. 6, Sept. 1923, pp. 20–30 and (discussion) 30–34. Discusses factors entering into movement of material, namely, management and labor, trucking system, material to be moved, conveyance, distance material has to be moved, and roadbed on which movement is made.

HARDNESS

Magnetic Testing. Magnetic Indications of Hardness and Brittleneness, A. V. de Forest. Am. Soc. for Steel Treating—Trans., vol. 4, no. 3, Sept. 1923, pp. 342–347, 1 fig. Describes recent developments.

HEAT TRANSMISSION

Thermal Conductivity. The Measurement of Thermal Conductivity, Ezer Griffiths and G. W. C. Kaye. Roy. Soc.—Proc., vol. 104, no. A724, Aug. 1, 1923, pp. 71–98, 12 figs. Describes three types of apparatus of "plate" type for rapid precision determination of thermal conductivities of materials of low conductivity.

HYDRAULIC ACCUMULATORS

Design. Design and Calculation of Hydraulic Accumulators (Entwerfen und Berechnen hydraulischer Akkumulatoren), A. Lambrette. Praktische Maschinen-Konstrukteur, vol. 56, no. 27, July 5, 1923, 4 pp., 6 figs. Calculation of cylinders, pistons, etc., for various pressures; control and safety devices; pumps; etc.

HYDRAULIC TURBINES

American and European. American and European Hydraulic Turbines (Amerikanische und europäische Wasserturbinen), V. Graf. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 37, Sept. 15, 1923, pp. 908–909. Reply to article by H. Birchard Taylor in Power, no. 12, June 1923, in which he compares progress in America and Europe in construction of hydroelectric plants.

Conical. High-Speed Conical Turbines (Ueber schnellaufende Konusturbinen), W. Zuppinger. Schweizerische Bauzeitung, vol. 82, no. 8, Aug. 25, 1923, pp. 97–101, 10 figs. Describes conical turbines constructed by Ateliers des Charmilles, Geneva, and explains principle upon which construction is based.

Kaplan. Development of Kaplan Turbine (Die Entwicklung der Kaplanturbine), Paul Walther. Elektro-Journal, vol. 3, no. 1, Jan. 1923, pp. 4–7, 12 figs. Results of braking tests carried out at technical laboratories in Germany, and of turbines constructed under license, showing increased efficiency (up to 92 per cent) and improvements made.

Pelton. New 26,000 Hp. Pelton Turbines at the Vanaus Central [Les nouvelles turbines Pelton de 26,000 C. V. de la centrale de Venaus (Mont-Cenis)], J. Boudet. Houille Blanche, vol. 22, no. 183, July-Aug. 1923, pp. 121–125, 7 figs. These turbines are built by Riva Co., Milan, for heat of 1100 m.; horizontal axis; details of design and operation.

Single-Runner Overhung Pelton Turbines. Engineering, vol. 116, no. 3015, Oct. 12, 1923, p. 461, 4 figs. partly on p. 464. Reaction turbines installed in power plant on Fagundes River, Brazil.

The Modern Pelton Wheel, F. Johnstone Taylor. Power Engr., vol. 18, nos. 209, 210 and 211, Aug., Sept. and Oct., 1923, pp. 298–300, 325–327 and 365–367, 20 figs. Its development and present-day construction. Describes some recent successful Pelton wheel plants.

HYDROELECTRIC DEVELOPMENTS

Japan. Power Plants in the Orient, S. Q. Hayes. Power Plant Eng., vol. 27, no. 19, Oct. 1, 1923, pp. 986–988, 6 figs. Review of recent power developments in Japan.

New York State. Beaver River Hydroelectric System, R. T. Livingston. Power Plant Eng., vol. 27, no. 20, Oct. 15, 1923, pp. 1015–1019, 11 figs. System composed of five small plants forms public service corporation called Northern New York Utilities, Inc., supplying electric light and power to majority of towns and cities in district and also to large number of paper mills.

HYDROELECTRIC PLANTS

Belfast. The Harbour Power Station, Belfast. Elec. Rev., vol. 93, no. 2387, Aug. 24, 1923, pp. 285–289, 15 figs. Provisions for electricity supply in Belfast. Description of new plant with present capacity of 24,500 kw., and possible capacity of 150,000 kw.

Economical Operation. Operating Hydro-Electric Plants To Obtain Most Economical Output, Ralph Brown. Power, vol. 58, no. 16, Oct. 16, 1923, pp. 614–616, 1 fig. Method of keeping record of plant performance to obtain best economy of available water; operating in parallel with steam plants; obtaining maximum output from hydroelectric units.

Italy. Piave-Santa Croce Hydroelectric Plants (Impianti idroelettrici Piave-Santa Croce), Carlo Semenza. Elettrotecnica, vol. 10, no. 26, Sept. 15, 1923, pp. 589–611, 43 figs. Piave-Santa Croce canal; describes Fadalto, Nove, San Floriano, Castelletto and Caneva plants.

Japan. A Great Japanese Power System, Ernest V. Pannell. Elec. Rev., vol. 93, no. 2389, Sept. 7, 1923, pp. 359–361, 5 figs. Details of Ohi hydroelectric plant, Osaka.

Sherman Island, Hudson River. Paper Company Completes Power Plant on the Hudson. Eng. News-Rec., vol. 91, no. 12, Sept. 20, 1923, pp. 470–476, 12 figs. Unusual geological condition of site; self-loading, multiple-arch dam; 864-ft. spillway; large concrete-lined canal; reinforced-concrete penstocks, scroll cases, and draft tubes.

Switzerland. The Ritom Hydroelectric Plant of the Swiss Federal Railway (Das Kraftwerk Ritom der S. B. B.), H. Eggenberger. Schweizerische Bauzeitung, vol. 81, nos. 20, 21, 22, 23, 24, 25 and 26, May 19, 26, June 2, 9, 16, 23 and 30, 1923, pp. 246–249, 255–256, 267–270, 287–289, 296–297, 305–308 and 318–321 and vol. 82, nos. 1, 5, 6 and 7, July 7, Aug. 4, 11 and 18, 1923, pp. 6–9, 65–66, 69–73 and 90–93, 94 figs. Part I: Hydraulic features: Constructional details; reservoir and dam; inlet tunnels; pressure pipe line; cableway. Part II: Mechanical and electrical details: Regulation of turbines; generators; transformers; switchgear; protective arrangements against overvoltage and excess-current; building and operating costs.

HYDROPLANES

Design. Hydroplanes (Note sur les hydroglisseurs), P. Boutiron. Bul. Technique du Bureau Veritas, vol. 5, no. 7, July 1923, pp. 142–147, 9 figs. A river or marine boat propelled by purely aerial means, which latter also sustain it in water; details of design and propulsion; discusses phenomenon of gliding and its practical application.

Development. Flying Boat or Hydroplane? (Flygbat eller flottörflygplan?), E. Meyer. Teknisk Tidskrift, vol. 53, no. 9, Mar. 3, 1923, pp. (Allmänna Avdelningen A) 65–67, 7 figs. Discusses development in Germany, and describes various types.

I

ICE PLANTS

Montgomery, Ala. Montgomery, Ala., Ice and Cold Storage Plant. Southern Engr., vol. 40, no. 1, Sept. 1923, pp. 61–64, 7 figs. Description of plant of Atlantic Ice & Coal Corp., which consists of three units, two 100-ton and one 40-ton capacity units; combined ice and cold storage plant.

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 166

Machine Work
* American Machine & Foundry Co.
* Brown, A. & F. Co.
* Builders Iron Foundry
DuPont Engineering Co.
* Franklin Machine Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
Lammert & Mann Co.
Link-Belt Co.
* Nordberg Mfg. Co.
Purvis Machine Co.

Machinery
(Is classified under the headings descriptive of character thereof)

Manometers
Bacharach Industrial Instrument Co.
* Simplex Valve & Meter Co.

Mechanical Draft Apparatus
* American Blower Co.
* Clarage Fan Co.
* Coppus Engineering Corp'n
* Green Fuel Economizer Co.
* Sturtevant, B. F. Co.

Mechanical Stokers
(See Stokers)

Metal Treating
* American Metal Treatment Co.

Metals, Perforated
* Hendrick Mfg. Co.

Meters, Air and Gas
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.

Meters, Boiler Performance
* Bailey Meter Co.

Meters, Condensation
* Simplex Valve & Meter Co.

Meters, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.
Weston Electrical Instrument Co.

Meters, Feed Water
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Flow
Bacharach Industrial Instrument Co.
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Spray Engineering Co.

Meters, Oil
* Bowser, S. F. & Co. (Inc.)
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Meters, Pitot Tube
* American Blower Co.
* Simplex Valve & Meter Co.

Meters, Steam
* Bailey Meter Co.
* Builders Iron Foundry
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, V-Notch
* Bailey Meter Co.
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n

Meters, Venturi
* Builders Iron Foundry
* National Meter Co.
* Simplex Valve & Meter Co.

Meters, Water
* General Electric Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* National Meter Co.
* Simplex Valve & Meter Co.
* Worthington Pump & Machinery Corp'n

Milling Machines, Hand
* Whitney Mfg. Co.

Milling Machines, Keyseat
* Whitney Mfg. Co.

Milling Machines, Plain
* Warner & Swasey Co.

Mills, Ball
* Allis-Chalmers Mfg. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mills, Blooming and Slabbing
Mackintosh-Hemphill Co.

Mills, Grinding
* Smidth, F. L. & Co.

Mills, Sheet and Plate
Mackintosh-Hemphill Co

Mills, Structural, Rail and Bar
Mackintosh-Hemphill Co.

Mills, Tube
* Allis-Chalmers Mfg. Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Mining Machinery
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Monel Metal
Driver-Harris Co.

Monorail Systems
(See Tramrail Systems, Overhead)

Motor-Generators
* Allis-Chalmers Mfg. Co.
* General Electric Co.
Ridgway Dynamo & Engine Co.
* Westinghouse Electric & Mfg. Co.

Motors, Electric
* Engberg's Electric & Mech. Wks.
* General Electric Co.
Master Electric Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Motors, Synchronous
Ridgway Dynamo & Engine Co.

Nickel, Sheet
Driver-Harris Co.

Nipple Threading Machines
* Landis Machine Co. (Inc.)

Nitrogen Gas
* Linde Air Products Co.

Nozzles, Aerating
* Spray Engineering Co.

Nozzles, Blast
* Schutte & Koerting Co.

Nozzles, Sand and Air
Lunkenheimer Co.

Nozzles, Spray
* Cooling Tower Co. (Inc.)
* Schutte & Koerting Co.
* Spray Engineering Co.

Odometers
Veeder Mfg. Co.

Ohmeters
* General Electric Co.
Weston Electrical Instrument Co.

Oil and Grease Cups
* Bowser, S. F. & Co. (Inc.)
* Crane Co.
Lunkenheimer Co.

Oil and Grease Guns
* Royersford Fdry. & Mach. Co.

Oil Burning Equipment
* Best, W. N. Corp'n
* Combustion Engineering Corp'n
Foerst, John & Sons
Improved Equipment Co.
Morse Dry Dock & Repair Co. (Fuel Oil Engrg. Co.)
* Schutte & Koerting Co.

Oil Filtering and Circulating Systems
* Bowser, S. F. & Co. (Inc.)
Nugent, Wm. W. & Co. (Inc.)

Oil Mill Machinery
* Worthington Pump & Machinery Corp'n

Oil Refinery Equipment
* Vogt, Henry Machine Co.

Oil Storage and Distributing Systems
* Bowser, S. F. & Co. (Inc.)

Oil Well Machinery
* Brownell Co.
* Ingersoll-Rand Co.
* Titusville Iron Works Co.
* Worthington Pump & Machinery Corp'n

Oiling Devices
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.
Nugent, Wm. W. & Co. (Inc.)

Oiling Systems
* Bowser, S. F. & Co. (Inc.)
Lunkenheimer Co.
Nugent, Wm. W. & Co. (Inc.)

Oils, Fuel
Texas Co.
Tide Water Oil Sales Corp'n

Oils, Lubricating
Texas Co.
Tide Water Oil Sales Corp'n
Vacuum Oil Co.

Ore Handling Machinery
* Brown Hoisting Machinery Co.
Chain Belt Co.
Link-Belt Co.

Ovens, Core
* Whiting Corporation

Oxy-Acetylene Supplies
* Linde Air Products Co.

Oxygen Gas
* Linde Air Products Co.

Packing, Ammonia
France Packing Co.
* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Packing, Asbestos
* Goodrich, B. F. Rubber Co.
Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Hydraulic
France Packing Co.
* Goodrich, B. F. Rubber Co.
Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Metallic
France Packing Co.
* Goetze Gasket & Packing Co.
Johns-Manville (Inc.)
Steel Mill Packing Co.

Packing, Rod (Piston and Valve)
France Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
Johns-Manville (Inc.)
Steel Mill Packing Co.
* United States Rubber Co.

Packing, Rubber
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
Johns-Manville (Inc.)
* United States Rubber Co.

Packing, Sheet
* Goetze Gasket & Packing Co.
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
Johns-Manville (Inc.)
Steel Mill Packing Co.
* United States Rubber Co.

Paints, Concrete (For Industrial Purposes)
Smooth-On Mfg. Co.

Paint, Metal
* Dixon, Joseph Crucible Co.
* General Electric Co.
Johns-Manville (Inc.)

Paper, Drawing
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Paper, Sensitized
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Paraffine Wax Plant Equipment
* Vogt, Henry Machine Co.

Pasteurizers
* Vilter Mfg. Co.

Pattern Work
* American Machine & Foundry Co.
DuPont Engineering Co.

Pencils, Drawing
American Lead Pencil Co.
Dietzgen, Eugene Co.
* Dixon, Joseph Crucible Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Penstocks
Smith, S. Morgan Co.

Petroleum Products
Texas Co.
Tide Water Oil Co.

Pile Drivers
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.

Pinions, Rolling Mill
Mackintosh-Hemphill Co.

Pinions, Steel
* General Electric Co.

Pipe, Cast Iron
* Builders Iron Foundry
* Central Foundry Co.
* U. S. Cast Iron Pipe & Fdry. Co.

Pipe, Riveted
* American Spiral Pipe Wks.
* Springfield Boiler Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Pipe, Soil
* Central Foundry Co.

Pipe, Steel
* Crane Co.

Pipe, Welded
* American Spiral Pipe Wks.
* Crane Co.
* Pittsburgh Valve, Fdry. & Const Co.

Pipe, Wrought Iron
* Crane Co.

Pipe Coils, Covering, Fittings, etc.
(See Coils, Covering, Fittings, etc., Pipe)

Pipe Cutting-off Machines
* Curtis & Curtis Co.

Pipe Cutting and Threading Machines
* Crane Co.
* Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Pipe Threading Machines
Treadwell Engineering Co.

Piping, Ammonia
* Frick Co. (Inc.)

Piping, Power
* Crane Co.
* Pittsburgh Valve, Fdry. & Const Co.
* Vogt, Henry Machine Co.

Pitot Tubes
(See Tubes, Pitot)

Planimeters
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Dietzgen, Eugene Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Plate Metal Work
(See Steel Plate Construction)

Pointers, Bolt
* Landis Machine Co. (Inc.)

Polishing Machinery
* Builders Iron Foundry
* Royersford Fdry. & Mach. Co.

Powdered Fuel Equipment (for Boiler and Metallurgical Furnaces)
* Allis-Chalmers Mfg. Co.
* Combustion Engineering Corp'n
* Fuller-Lehigh Co.
* Quigley Furnace Specialties Co.
* Smidth, F. L. & Co.
* Worthington Pump & Machinery Corp'n

Power Transmission Machinery
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Franklin Machine Co.
* General Electric Co.
* Hyatt Roller Bearing Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Morse Chain Co.
* Poole Engrg. & Mach. Co.
* Royersford Fdry. & Mach. Co.
* Smidth, F. L. & Co.
Smith, S. Morgan Co.
* Woods, T. B. Sons Co.

Presses, Baling
* Franklin Machine Co.
Philadelphia Drying Mchry. Co.

Presses, Draw
* Niagara Machine & Tool Works

Presses, Foot
* Royersford Fdry. & Mach. Co.

Presses, Hydraulic
* Falls Clutch & Machinery Co.
Mackintosh-Hemphill Co.
Philadelphia Drying Mchry. Co.

Presses, Punching and Trimming
Long & Allstatter Co.
* Niagara Machine & Tool Works
* Royersford Fdry. & Mach. Co.

Presses, Sheet Metal Working
* Niagara Machine & Tool Works

Presses, Toggle
* Niagara Machine & Tool Works

Presses, Wax
* Vogt, Henry Machine Co.

Pressure Gages, Regulators, etc.
(See Gages, Regulators, etc., Pressure)

Producers, Gas
* De La Vergne Machine Co.
Otto Engine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Mchry. Corp'n

Propellers
* Morris Machine Works

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

Oil-Engine Drive. Ice-Making with Oil Engines. Refrigeration, vol. 32, no. 6, July 1923, pp. 30–34, 5 figs. Plant in Jersey City which has normal daily capacity of 200 tons. Experimental work showed that oil-engine drive was most economical.

Oil- vs. Corliss-Engine-Driven. Comparative Cost of Operating a 20-Ton Ice Plant. Southern Engr., vol. 40, no. 1, Sept. 1923, pp. 50–52, 2 figs. Comparison of operating costs of a Diesel-oil-engine and a Corliss-engine-driven 20-ton plant.

INDICATORS

Micro, for High-Speed Engines. A New Type of High-Speed Engine Indicator. Power Engr., vol. 18, no. 210, Sept. 1923, pp. 351–352, 5 figs. Main features and advantages of Collins' patent micro-indicator, made by Cambridge & Paul Instrument Co.

INDUSTRIAL MANAGEMENT

Absence Records. Absence Records That Aid in Production Planning. Factory, vol. 31, no. 4, Oct. 1923, pp. 460–461, 500 and 502, 4 figs. Records of absenteeism collected from four large Philadelphia textile firms during over three years and dependable facts brought out by them.

Control Methods. The Control of an Industry in the Business Cycle, Howard Coonley. Taylor Soc.—Bul., vol. 8, no. 4, Aug. 1923, pp. 128–136, 5 figs. Methods employed in plants of Walworth Mfg. Co. Development of cost accounting, changes in organization, application of cycle theory and data to Walworth planning; budgetary control of sales, purchases, receipts, and expenditures.

Production Planning. Organization of Work at Factory Shop of the Arts & Métiers School at Paris (Organisation du travail dans l'atelier de fonderie de l'école d'Arts & Métiers de Paris), Gaston Vidal. Arts et Métiers, vol. 76, no. 34, July 1923, pp. 641–656. Details of work by students and sample forms used for workshop orders; finding cost production, etc.

INDUSTRIAL RELATIONS

Employers' Organizations. Employers' Associations in the United States. Int. Labour Rev., vol. 8, no. 3, Sept. 1923, pp. 367–379. Activities of employers' associations; U. S. Chamber of Commerce; Nat. Assn. of Mfrs.

Industrial Disputes, Settlement of. How Germany Settles Industrial Disputes, Emil Frankel. Monthly Labor Rev., vol. 17, no. 3, Sept. 1923, pp. 8–17. Legal conciliation agencies; jurisdiction, organization and procedure of conciliation boards; voluntary adjustment agencies; effectiveness of conciliation system; proposed measures for adjustment of disputes.

INDUSTRIAL TRUCKS

Electric. Electric Single-Axle Truck (Der Elektro-Einachs-Schlepper), Trautvetter. Elektro-Journal, vol. 3, no. 5, May 1923, pp. 93–95, 5 figs. A two-wheel truck with storage batteries at both sides of axle, having capacity of 3.5 hp. at 60 volts; battery capacity, 3 hr. uninterrupted work; can be used for street transportation, factory railways, in shunting yards, etc.

INTERNAL-COMBUSTION ENGINES

Crankless. Crankless Engines. Autocar, vol. 51, no. 1455, Sept. 7, 1923, p. 419, 3 figs. 8-cylinder design likely to be developed for aircraft use, and may also be applicable to automobile.

Fuel-Injection Pump. The Time Lag and Interval of Discharge with a Spring Actuated Fuel Injection Pump, Robertson Matthews and A. W. Gardiner. Nat. Advisory Committee for Aeronautics—Tech. Notes, no. 159, Sept. 1923, 17 figs., 1 fig. Deals with research on spring-actuated fuel pump for solid or airless injection with small, high-speed internal-combustion engines.

Fuels for. Fuels for Internal Combustion Engines, with Special Reference to Alcohol Production, Frederick Nathan. Fuel in Sci. & Practice, vol. 2, no. 8, Sept. 1923, pp. 249–254. Survey of possible substitutes for gasoline for use in internal-combustion engines.

Heat Transmission in. Heat Transmission in Internal-Combustion Engines (Der Wärmeübergang in der Verbrennungskraftmaschine), Wilhelm Nusselt. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 28, July 14, 1923, pp. 692–695, 5 figs. Based on explosion tests in ball-shaped bombs; study is made of cooling of hot combustion gases; formulas for heat transmission coefficients are derived; and equation is developed for calculation of heat exchange between gas and wall in internal-combustion engine.

High-Power. High-Power Explosion Engines (Moteurs à explosion à haut rendement), Maurice Dumas. Technique Moderne, vol. 15, no. 17, Sept. 1, 1923, pp. 530–534, 8 figs. Inadequacy of Rochas cycle; gives variation and dimensions; instead of cutting to dead point, stops short of it; gives illustrative examples.

Losses in. Losses in Heat Engines and Means of Reducing Them, W. P. Sillince. Diesel Engine Users Assn., Reprint Paper, for meeting June 8, 1923, 37 pp., including discussion, 8 figs. Reducing waste and improving efficiency of heat engines of internal-combustion, particularly Diesel type; principal losses of heat; typical Diesel-engine heat balance, losses to jacket water and exhaust; Still engines.

Research and Testing Plant. The Works and Laboratory of Messrs. Ricardo & Co., Ltd. Automobile Engr., vol. 13, no. 180, Sept. 1923, pp. 275–278, 10 figs. Résumé of activities at Bridge Works, Sussex; methods and equipment.

Swedish Two-Stroke. New Swedish Two-Stroke Internal-Combustion Engine With Direct Injection (En ny svensk tvatakts förbränningsmotor med direkt insprutning), Gunnar Dellner. Teknisk Tidskrift, vol. 53, no. 16, Apr. 21, 1923, pp. (Mekanik) 37–42, 9 figs. Design and construction of a high-pressure engine (minimum 28 kg. per sq. cm.) with direct injection, without compressed air.

[See also AIRPLANE ENGINES; AUTOMOBILE ENGINES; CARBURETORS; DIESEL ENGINES; MOTORCYCLES, Engines; OIL ENGINES.]

IRON CASTINGS

Chilled Rolls. Application of Scientific Principles to the Manufacture of Chilled Rolls, Emil Schutz. Foundry Trade Jl., vol. 28, no. 367, Aug. 30, 1923, pp. 176–179, 8 figs. Results of investigation of number of problems relating to manufacture of chilled rolls recently carried out in Germany; factors studies include cooling of rolls, heating of chills, contraction, chill, casting strains and temperature, hardness, and chemical and metallurgical properties of castings. Translated from Stahl u. Eisen.

IRON, PIG

Electrolytic Production. Production of Pig Iron by the Electric Furnace (La fabrication de la fonte au four électrique), Clausel de Coussergues. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 76, no. 4–5, Apr.-May 1923, pp. 543–564. Describes different types of furnaces; reactions in electric blast furnaces, and reagents used; comparison of open and closed furnaces; future of pig iron production by electric furnace.

L

LABORATORIES

Aerodynamic. The Melbourne University Aerodynamic Laboratory, W. E. Bassett. Commonwealth Engr., vol. 10, no. 11, June 1, 1923, pp. 410–412, 4 figs. Designed to carry our research work on aircraft machine, engines, and construction material; for affording instruction to engineering students; testing accurate models of airplanes or airships; testing actual engines used as to horsepower developed, fuel consumption, faults, etc; and to advance technical knowledge of science of aeronautics.

LATHES

Locomotive Wheel Boss. Lathes for Locomotive Wheel Bosses (Lokomotivradsatz-Drehbank), H. Krupski. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 35, Sept. 1, 1923, pp. 858–861, 11 figs. Influence of attempts to increase efficiency on design of machine; principal parts, drive and feed; advantages of new lathe.

LIFTING MAGNETS

Raw-Material Handling. The Industrial Advantages of Electric Lifting Magnets, F. N. Reville. Australasian Elec. Times, vol. 2, no. 7, July 27, 1923, pp. 468 and 471–473, 2 figs. Description of magnets designed for handling raw material.

LIGNITE

U. S. Deposits. Neglected Sources of Home Supply of Liquid Fuel. Oil Eng. & Finance, vol. 4, no. 83, Aug. 11, 1923, pp. 141–142. Oil obtainable from valuable lignite deposits in the United States; industrial importance of deposits.

LOCOMOTIVE BOILERS

Repairing. Repairing Locomotives in a Contract Shop. Boiler Maker, vol. 23, no. 9, Sept. 1923, pp. 245–249, 7 figs. Description of contract locomotive repair shop that was built up around a war-time ordnance plant; types of boiler repairs handled and methods employed.

LOCOMOTIVES

Average Life. A Mortality Table for the Steam Locomotive, F. H. Adams. Ry. Rev., vol. 73, no. 12, Sept. 22, 1923, pp. 423–424. Interstate Commerce Commission bureau of valuation finds that average expected life for 8165 locomotives is about 31 years.

Carbon-Vanadium Steel for Reducing Weight. A Practical Example of Carbon-Vanadium Steel Use, R. J. Finch. Ry. Rev., vol. 73, no. 15, Oct. 13, 1923, pp. 532–534, 2 figs. Dynamic augment and weight of new Chicago & Northwestern Ry. Pacific-type locomotive reduced.

Consolidation. Consolidation Locomotive for the Polish State Railways, H. Dabrowski. Ry. Mech. Engr., vol. 97, no. 9, Sept. 1923, p. 623. Details of Consolidation or 2-8-0 type for handling freight traffic.

Design. Modern Locomotive Engine Design and Construction. Ry. Engr., vol. 44, nos. 522 and 524, July and Sept. 1923, pp. 269–275, and 334–339 and 350, 21 figs. July: Positive location of plates and buckle for laminated-type spring; determination of stresses in plate springs and buckles; application of load to laminated-type springs; adjustment of weight on springs; load-compensating arrangements. Sept.: Laminated springs; spring-compensating gear; design of coiled springs.

Feedwater Treatment. Treatment of Feed Water for Locomotive Use, and Result. Ry. & Locomotive Eng., vol. 36, no. 10, Oct. 1923, pp. 310–314. Report of committee to Traveling Engrs.' Assn.

Fireless. Fireless Locomotives. Eng. Progress, vol. 4, no. 7, July 1923, pp. 157–160, 12 figs. Design and operation; efficiency; advantages; field of utilization.

Heat Economy in. Heat Economy in Steam Locomotives, L. Schneider. Eng. Progress, vol. 4, no. 7, July 1923, pp. 139–144, 10 figs. Economy in design of furnace, boiler, preheaters, superheaters, engine and valve gear.

Internal-Combustion. High Power Internal Combustion Locomotives, J. S. Tritton. Ry. Rev., vol. 73, no. 14, Oct. 6, 1923, pp. 497–499, 4 figs. Also Ry. Engr., vol. 44, no. 524, Sept. 1923, pp. 325–327 and (discussion) 327–328, 4 figs. Transmission presents principal problem of adopting internal-combustion engines to locomotive service.

Lentz. The Lentz Valve as a Factor in Locomotive Design, Desider Ledacs Kiss. Ry. Rev., vol. 73, nos. 7 and 8, Aug. 18 and 25, 1923, pp. 225–233 and 269–275, 22 figs. Design and use of lift valves on European locomotives.

Mikado. Mikado Type Locomotives for Duluth & Iron Range. Ry. Jl., vol. 29, no. 9, Sept. 1923, p. 16, 1 fig. Equipped with feedwater heater and booster; with aid of latter tractive force is increased to 70,000 lb.; booster is piped to use superheated steam.

Mixed-Service. Locomotives for Mixed Service, G. Reder. Eng. Progress, vol. 4, no. 7, July 1923, pp. 151–154, 4 figs. Describes recent types of locomotives which may be used for greatest possible number of different types of trains.

Thermic Siphons. A Dynamometer Car Test on the N. C. & St. L. Ry. Ry. Rev., vol. 73, no. 15, Oct. 13, 1923, pp. 521–526, 7 figs. Value of thermic siphon determined in test of same locomotive with or without this device. See also Ry. Mech. Engr., vol. 97, no. 9, Sept. 1923, pp. 521–526, 7 figs.

Turbo-Electric Condensing. Ramsay Turbo-Electric Condensing Locomotive. Ry. Age, vol. 75, no. 15, Oct. 13, 1923, pp. 667–668, 3 figs. Experimental locomotive under development in England; results of tests.

The Ramsay Turbo-Electric Condensing Locomotive. Ry. Gaz., vol. 39, no. 12, Sept. 21, 1923, pp. 362–366, 6 figs. Further details of this locomotive and results of trials.

Valve Gears. Setting Valve Gears of the Radial Type, S. P. Kennedy. Ry. Mech. Engr., vol. 97, no. 10, Oct. 1923, pp. 701–704, 7 figs. Rapid method of setting and adjusting radial valve gears without rolling wheels.

Valve Control for Locomotives, H. Dübbel. Eng. Progress, vol. 4, no. 7, July 1923, pp. 149–151, 8 figs. Describes type which proved advantageous not only from standpoint of railway service, but also from that of heat economy and technique of manufacture.

LUBRICATING OILS

Properties. Lubricating Oils (Les huiles industrielles de graissage), J. Lévy. Technique Moderne, vol. 15, no. 17, Sept. 1, 1923, pp. 522–530, 6 figs. Properties desired in liquid lubricants; animal and vegetable oils and fats; distillation; cracking; fractionation in refining of oil.

Re-refining. A New Lubrication Development, David W. Dickie. Pac. Mar. Rev., vol. 20, no. 9, Sept. 1923, pp. 451–452. Describes process of refining discarded lubricating oil and recovering good lubricant contained therein.

Steam-Engine Cylinders. What Oil for Steam Engines?, Forrest A. Hoff. Oil News, vol. 11, no. 16, Aug. 20, 1923, pp. 28–29. Suggestions for compounding right oils for steam cylinders; type of feed, steam temperature and dryness important; formulas for cylinder oil.

Turbine. Deterioration of Turbine Oils in Use, Alexander Duckham and Stanley E. Bowrey. Engineering, vol. 116, no. 3012, Sept. 21, 1923, p. 353, 1 fig. Discusses deterioration due to atmospheric action on warm oils as principal cause of emulsification, and other circumstances contributing ill effects.

LUBRICATION

Boundary. The Nature of Lubrication in Engineering Practice, T. E. Stanton. Instn. Petroleum Technologists—Jl., vol. 9, no. 38, Aug. 1923, pp. 260–273, 4 figs. Results of pendulum experiments show that by means of comparatively simple apparatus characteristics of lubricants and bearing metals under conditions of boundary lubrication can be investigated rapidly and conveniently.

Pressure Lubricator. The "Ref" Pressure Lubricator. Engineering, vol. 116, no. 3014, Oct. 5, 1923, p. 426, 14 figs. Mechanical lubricator of German design suitable for use on marine steam engines, locomotives, internal-combustion engines, compressors etc., chief feature of which is that any number of points up to 12 or more can be supplied with oil.

M

MACHINE DESIGN

Beauty in. Is Beauty an Important Factor in Machine Design?, K. H. Condit. Am. Mach., vol. 59, no. 13, Sept. 27, 1923, pp. 461–462, 1 fig. Views of Maxfield Parrish, artist, machinist and draftsman, who maintains that there is close relationship between artist and what he calls creative machinist.

MACHINE SHOPS

Skoda Works, Czechoslovakia. Skoda and the Revolution of Pilsen, Henry Obermeyer and Arthur L. Greene. Am. Mach., vol. 59, no. 14, Oct. 4, 1923, pp. 519–524, 8 figs. Cause for change in products produced; activity in railway and locomotive equipment; Skoda's resources; conditions regarding labor, coal and raw material.

MACHINE TOOLS

Paper Machinery. Special Tools for Making Paper-Mill Machinery, E. T. Spidy. Am. Mach., vol.

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 166

Pulleys, Friction Clutch
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
* Falls Clutch & Machinery Co.
Johnson, Carlyle Machine Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Iron
* Brown, A. & F. Co.
Chain Belt Co.
* Falls Clutch & Machinery Co.
* Gifford-Wood Co.
* Jones, W. A. Fdry. & Mach. Co.
Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Pulleys, Paper
Rockwood Mfg. Co.

Pulleys, Steel
* Medart Co.

Pulleys, Wood
* Medart Co.

Pulling Tables (For Annealing Furnaces)
* Kenworthy, Chas. F. (Inc.)

Pulverizers
* Brown, A. & F. Co.
* Fuller-Lehigh Co.
* Smidth, F. L. & Co.

Pump Governors, Valves, etc.
(See Governors, Valves, etc. Pump)

Pumping Engines
(See Engines, Pumping)

Pumping Systems, Air Lift
* Ingersoll-Rand Co.

Pumps, Acid
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
Taber Pump Co.
* Titusville Iron Works Co.

Pumps, Air
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Ammonia
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Vogt, Henry Machine Co.
* Worthington Pump & Machinery Corp'n

Pumps, Boiler Feed
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Coppus Engineering Corp'n
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Wheeler, C. H. Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Centrifugal
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Cramp, Wm. & Sons Ship & Engine Bldg. Co.
* De Laval Steam Turbine Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
Lammert & Mann Co.
* Morris Machine Works
* Nordberg Mfg. Co.
Taber Pump Co.
* Westinghouse Electric & Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Condensation
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Wheeler, C. H. Mfg. Co.

Pumps, Deep Well
* Allis-Chalmers Mfg. Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Luitwieler Pumping Engine Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Dredging
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Electric
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Luitwieler Pumping Engine Co.
* Morris Machine Works
* Nordberg Mfg. Co.
Taber Pump Co.
* Worthington Pump & Machinery Corp'n

Pumps, Elevator
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Filter Press
Buffalo Steam Pump Co.
* Goulds Mfg. Co.

Pumps, Hand
* Goulds Mfg. Co.
Taber Pump Co.

Pumps, Hydraulic
* American Fluid Motors Co.

Pumps, Hydraulic Pressure
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Worthington Pump & Machinery Corp'n

Pumps, Lift and Force
Luitwieler Pumping Engine Co.

Pumps, Measuring
Wayne Tank & Pump Co.

Pumps, Measuring (Gasoline or Oil)
* Bowser, S. F. & Co. (Inc.)

Pumps, Mine
Luitwieler Pumping Engine Co.

Pumps, Oil
* Bowser, S. F. & Co. (Inc.)
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lunkenheimer Co.
Nugent, Wm. W. & Co. (Inc.)
Taber Pump Co.
* Worthington Pump & Machinery Corp'n

Pumps, Oil, Force-Feed
* Bowser, S. F. & Co. (Inc.)
* Goulds Mfg. Co.
Lunkenheimer Co.

Pumps, Oil (Hand)
* Bowser, S. F. & Co. (Inc.)
* Goulds Mfg. Co.
Lunkenheimer Co.
Nugent, Wm. W. & Co. (Inc.)

Pumps, Pneumatic Pressure
Luitwieler Pumping Engine Co.

Pumps, Power
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Luitwieler Pumping Engine Co.
* Nordberg Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Rotary
* Goulds Mfg. Co.
Lammert & Mann Co.
Taber Pump Co.

Pumps, Steam
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Ingersoll-Rand Co.
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sugar House
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Pumps, Sump
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Morris Machine Works
* Smidth, F. L. & Co.
Taber Pump Co.

Pumps, Tank
Buffalo Steam Pump Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Luitwieler Pumping Engine Co.
Taber Pump Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Turbine
* Allis-Chalmers Mfg. Co.
Buffalo Steam Pump Co.
* De Laval Steam Turbine Co.
* General Electric Co.
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
* Kerr Turbine Co.
* Morris Machine Works
* Westinghouse Electric & Mfg. Co.
* Worthington Pump & Machinery Corp'n

Pumps, Vacuum
Buffalo Steam Pump Co.
* Croll-Reynolds Engrg. Co. (Inc.)
* Goulds Mfg. Co.
* Ingersoll-Rand Co.
Lammert & Mann Co.
* Nordberg Mfg. Co.
* Wheeler, C. H. Mfg. Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Punches, Multiple
* Long & Allstatter Co.
Mackintosh-Hemphill Co.

Punches, Power
* Niagara Machine & Tool Works
* Royersford Fdry. & Mach. Co.

Punches and Dies
* Royersford Fdry. & Mach. Co.

Punching and Coping Machines
* Long & Allstatter Co.

Punching and Shearing Machines
* Long & Allstatter Co.
* Royersford Fdry. & Mach. Co.

Purifiers, Ammonia
* Frick Co. (Inc.)

Purifiers, Oil
* Bowser, S. F. & Co. (Inc.)
Elliott Co.
Nugent, Wm. W. & Co. (Inc.)

Purifying and Softening Systems Water
International Filter Co.
* Scaife, Wm. B. & Sons Co.

Pyrometers, Electric
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
* Crosby Steam Gage & Valve Co.
Engelhard, Chas. (Inc.)
* Superheater Co.
* Taylor Instrument Cos.

Pyrometers, Expansion Stem
* Tagliabue, C. J. Mfg. Co.

Pyrometers, Optical
* Taylor Instrument Cos.

Pyrometers, Pneumatic
* Uehling Instrument Co.

Pyrometers, Radiation
* Taylor Instrument Cos.

Racks, Machine, Cut
* James, D. O. Mfg. Co.
* Jones, W. A. Fdry. & Mach. Co.

Racks, Storage, Metal
Manufacturing Equipment & Engrg. Co.

Radiators, Steam and Water
* American Radiator Co.
* Smith, H. B. Co.

Railways, Industrial
Link-Belt Co.

Rams, Hydraulic
* Goulds Mfg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Air
* Brownell Co.
* Ingersoll-Rand Co.
* Scaife, Wm. B. & Sons Co.
* Walsh & Weidner Boiler Co.
* Wheeler Cond. & Engrg. Co.
* Worthington Pump & Machinery Corp'n

Receivers, Ammonia
* Frick Co. (Inc.)

Recorders, CO
* Tagliabue, C. J. Mfg. Co.
* Uehling Instrument Co.

Recorders, CO_2
* Tagliabue, C. J. Mfg. Co.
* Uehling Instrument Co.

Recorders, SO_2
* Tagliabue, C. J. Mfg. Co.
* Uehling Instrument Co.

Recording Instruments
(See Instruments, Recording)

Reducing Motions
* Crosby Steam Gage & Valve Co.

Refractories
* Drake Non-Clinkering Furnace Block Co.
Keystone Refractories Co.
* King Refractories Co. (Inc.)

Refrigerating Machinery
* De La Vergne Machine Co.
* Frick Co. (Inc.)
* Ingersoll-Rand Co.
Johns-Manville (Inc.)
* Nordberg Mfg. Co.
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Blower
* Davis, G. M. Regulator Co.
* Mason Regulator Co.

Regulators, Condensation
* Tagliabue, C. J. Mfg. Co.

Regulators, Damper
* Coppus Engineering Corp'n.
* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
* Mason Regulator Co.

Regulators, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Regulators, Feed Water
* Edward Valve & Mfg. Co.
Elliott Co.
* Kieley & Mueller (Inc.)

Regulators, Flow (Steam)
* Davis, G. M. Regulator Co.
* Schutte & Koerting Co.

Regulators, Humidity
* Fulton Co.
* Tagliabue, C. J. Mfg. Co.

Regulators, Hydraulic Pressure
* Mason Regulator Co.

Regulators, Liquid Level
* Tagliabue, C. J. Mfg. Co.

Regulators, Pressure
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
Engelhard, Chas. (Inc.)
* Fulton Co.
* General Electric Co.
* Kieley & Mueller (Inc.)
* Mason Regulator Co.
* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.

Regulators, Pump
(See Governors, Pump)

Regulators, Temperature
* Bristol Co.
Engelhard, Chas. (Inc.)
* Fulton Co.
* Kieley & Mueller (Inc.)
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* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.

Regulators, Time
* Tagliabue, C. J. Mfg. Co.

Reservoirs, Aerating
* Spray Engineering Co.

Resistance Material (Electrical)
Driver-Harris Co.

Revolution Counters
(See Counters, Revolution)

Rivet Heaters, Electric
* General Electric Co.

Riveters, Hydraulic
Mackintosh-Hemphill Co.

Riveters, Pneumatic
* Ingersoll-Rand Co.

Riveting Machines
* Long & Allstatter Co.

Roller Bearings
(See Bearings, Roller)

Rolling Mill Machinery
Mackintosh-Hemphill Co.
Treadwell Engineering Co.

Rolls, Bending
* Niagara Machine & Tool Works

Rolls, Crushing
Link-Belt Co.
* Worthington Pump & Machinery Corp'n

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* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

Rolls, Steel
Mackintosh-Hemphill Co

Roofing
Johns-Manville (Inc.)
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Roofing, Asbestos
Johns-Manville (Inc.)

Rope, Hoisting
Clyde Iron Works Sales Co.
* Roebling's, John A. Sons Co.

Rope, Transmission
Link-Belt Co.
* Roebling's, John A. Sons Co.

Rope, Wire
Clyde, Iron Works Sales Co.
* Roebling's, John A. Sons Co.

*Catalogue data of firms marked * appear in the A.S.M.E. Condensed Catalogues of Mechanical Equipment, 1923-24 Volume*

59, no. 16, Oct. 18, 1923, pp. 575–578, 11 figs. Machines and methods used by Dominion Engineering Works; turning, boring and grinding large cylinders and rolls of various materials.

Railway-Wheel Production. Machine Tools for Railway Wheel Production. Machy. (Lond.), vol. 22, no. 570, Aug. 30, 1923, pp. 685–691, 12 figs. Duplex boring mills by Webster & Bennett, Ltd., Coventry.

MACHINING METHODS

Curves, Large Radius. The Machining of Curves of Large Radius, E. W. Eager. Mech. World, vol. 74, nos. 1910 and 1912, Aug. 10 and 24, 1923, pp. 78 and 110–111, 5 figs. Methods and instruments for producing work, gages, or templets which have arcs or curves in their form.

MAGNESIUM ALLOYS

Properties. Magnesium and Extra-Light Alloys (Le magnesium et les alliages ultra-légers), Albert Portevin. Société des Ingenieurs Civils de France—Memoires et Compte Rendu des Travaux, vol. 76, no. 4–5, Apr.-May 1923, pp. 486–507, 9 figs. partly on supp. plates. Mechanical properties of magnesium and effect of addition of other metals; effect of extrusion on mechanical properties; producers of magnesium alloys and analyses of their products; advantages and uses of extra-light alloys.

MALLEABLE CASTINGS

Structure. Malleable Castings and Their Changes at High Temperature (Sur la constitution des Fontes Malléables et les modifications qu'elles subissent instantanément aux hautes temperatures). Fonderie Moderne, vol. 17, Aug. 1923, pp. 274–276, 5 figs. Compares American and European malleable castings and their micro-structure. (Revue de la Soudure autogene).

MATERIALS

Cohesive Force. Cohesion from the Engineering Standpoint, A. A. Griffith. Engineering, vol. 116, no. 3012, Sept. 21, 1923, p. 377. Explains author's theory of plastic strain, in which conclusion is reached that it is simply external manifestation of phase changes occurring within material. Paper before Brit. Assn.

Strength Testing. Further Researches on the Strength of Materials, W. E. Dalby. Roy. Soc.—Proc., vol. 103, no. A720, Apr. 3, 1923, pp. 8–25, 7 figs. Describes recent researches with author's modified testing machine and elastic recorder, and his new instrument for getting records of torque and twist between positive and negative limits, called elastic torque-twist recorder.

The Testing of Materials and Its Effect on Engineering, G. B. Upton. Soc. Automotive Engrs.—Jl., vol. 13, no. 4, Oct. 1923, pp. 296–299 and (discussion) 299–300 and 312. Properties of materials; endurance curves; factor of safety. Discusses the four bases of design, namely strength, fatigue, stiffness, and shock.

METALLOGRAPHY

A. S. T. M. Report. Report of Committee E-4 on Metallography. Am. Soc. Testing Matls.—advance paper, no. 18, for meeting June 25–29, 1923, 15 pp. Proposed tentative definitions of terms relating to metallography; photography as applied to metallography; and metallographic testing of non-ferrous metals and alloys.

Structure, Theory of. Development and Possible Achievements of Metallographic Research (Entwicklung und mögliche Ziele der metallkundlichen Forschung), F. Sauerwald. Zeit. für Metallkunde, vol. 15, no. 7, July 1923, pp. 184–190. With special consideration of kinetic theory of structure.

METALS

Cutting Resistance of. The Significance of Tool Temperatures as a Function of the Cutting Resistance of Metals, H. A. Schwartz and W. W. Flagle. Am. Soc. Testing Matls.—advance paper, no. 21, for meeting June 25–29, 1923, 14 pp., 7 figs. Describes instrument for recording changes of temperature of drill or other cutting tool in action; gives data covering typical ferrous alloys of commerce; relations between energy per cu. in. of metal removed; temperature, and rate of removal of metal suggests utility of pyrometer in place of tool dynamometer.

Fatigue of. The Fatigue Failure of Metals, C. F. Jenkin. Roy. Soc.—Proc., vol. 103, no. A720, Apr. 3, 1923, pp. 121–138, 13 figs. Describes theory which appears to offer reasonable explanation of most of principal phenomena observed when wrought iron, steel, nickel, copper and some other metals are tested.

Gases in. Gases in Metals, Louis Jordan. Am. Soc. Testing Matls.—advance paper, no. 20, for meeting June 25–29, 1923, 16 pp. Methods for determining gases in metals; effects of gases in practical metallurgy; application of methods of analysis for gases.

Rustproof. Acid and Rust Proof Materials for Chemical Works, Rex Furness. Chem. Age, (Lond.), vol. 9, no. 219, Aug. 25, 1923, pp. 198–200. Describes more important acid-resisting and rustproof metals and alloys and discusses chemical properties which are demanded.

MOLDING MACHINES

Flask Equipment. Suitable Flask Equipment for Molding Machine, Arnold Lenz. Can. Foundryman, vol. 14, no. 9, Sept. 1923, pp. 13–16 and 32, 19 figs. Laying out of flasks; materials for flasks; equipment should be interchangeable; no gaggers need be used, if properly fitted to pattern; sand strip, which is really a permanent continuous gagger, recommended.

MOLDING METHODS

Planer Tables. How to Mold a Planer Table, R. H. Palmer. Foundry, vol. 51, no. 19, Oct. 1, 1923, pp. 767–769, 8 figs. Method of preparing and venting sand bed to prevent scabbing on face; faults of omission and commission in patternmaking practice.

MOLDS

Design. Design of Cast-Iron Molds for Casting under Pressure (Le Dessin des Coquilles pour le Moulage sous pression). Fonderie Moderne, vol. 17, Aug. 1923, pp. 256–258, 1 fig. Difficulties in casting, elimination of air, complete filling of mold, life of mold of various compositions. (Abstract from La Machine Moderne.)

Gating. The Importance of Proper Gating, F. C. Edwards. Metal Industry (Lond.), vol. 23, no. 10, Sept. 7, 1923, pp. 195–196, 3 figs. Discusses factors which should be considered.

MOTOR BUSES

Design. New Yellow Coach Bus Chassis has 4-Wheel Brakes. Motor Trans. (N. Y.), vol. 29, no. 3, Sept. 1, 1923, pp. 92–97, 11 figs. Built for general use throughout the country and will accommodate single or double-deck bodies; 4-cylinder 4 by 6 Knight engine used.

Suspension. Automobile Suspension (Contribution à l'étude de la suspension automobile), M. Friquet. Industrie des Tramways, vol. 17, no. 200, Aug. 1923, pp. 269–275, 8 figs. Design of suspensions of Paris omnibuses; develops simple theory for construction of a suspension having variable flexibility; describes types of suspensions studied and results obtained.

MOTOR-TRUCK TRANSPORTATION

Cost. What Determines the Cost of Truck Haulage? Contract Rec. & Eng. Rev., vol. 37, no. 38, Sept. 19, 1923, pp. 898–900. Items which are often overlooked in figuring true cost of motor-truck transportation; selecting cost unit.

MOTOR TRUCKS

German. A New German Lorry. Motor Transport (Lond.), vol. 37, no. 967, Sept. 10, 1923, pp. 323–324, 3 figs. Front-wheel-driven three tonner with hydraulically controlled transmission to be exhibited at Berlin Show.

Six-Wheel Conversion Set. A Six-Wheel Conversion. Motor Transport (Lond.), vol. 37, no. 967, Sept. 10, 1923, pp. 327–328, 5 figs. Danish invention for increasing carrying capacity of small or large vehicles.

Steam. Foden's Bring Out a Six-Wheeler. Motor Transport (Lond.), vol. 37, no. 969, Sept. 24, 1923, pp. 375–377, 6 figs. Details of new truck developed by Foden Works at Sandbach, Eng., specially designed for turning in confined spaces and with numerous other original features; tractive unit fully 12 tons; compound engine supplied with steam at 220 lb. per sq. in. boiler pressure from locomotive-type boiler.

MOTORCYCLES

Engines. The Columbus Light Motorcycle Engine (Der "Columbus" Leichtkraftrad-Motor), G. Reinhard. Motorwagen, vol. 26, no. 20, July 31, pp. 329–331, 5 figs. A one-cylinder four-stroke engine weighing 8.5 kg.

N

NOMENCLATURE

A.S.T.M. Committee Report. Report of Committee E-8 on Nomenclature and Definitions. Am. Soc. for Testing Matls.—advance paper, no. 5, for meeting June 25–29, 1923, 16 pp.

NON-FERROUS METALS

A.S.T.M. Report. Report of Committee B-2 on Non-Ferrous Metals and Alloys. Am. Soc. Testing Matls.—advance paper, no. 15, for meeting June 25–29, 16 pp., 1 fig. Proposed revised tentative specifications for seamless admiralty condenser tubes and ferrule stock; and for determination of zinc in pig lead.

Electrolytic Production. Metallurgy of Electrolytic Non-Ferrous Metals (Métallurgie des métaux non ferreux par l'électrolyse), M. Altmayer. Société des Ingénieurs Civils de France—Mémoires et Compte Rendu des Travaux, vol. 76, no. 4–5, Apr.-May 1923, pp. 508–542, 7 figs. partly on supp. plate. Discusses copper, lead, tin, zinc, cadmium, nickel and precious metals, and describes principally American practice of electrolytic production.

Research Problems. The Trend of Research in the Non-ferrous Industry, Paul D. Merica. Indus. & Eng. Chem., vol. 15, no. 9, Sept. 1923, pp. 895–897. Corrosion problem; what is to be done with scrap; chemistry of metals at high temperature; new industrial uses for non-ferrous metals and alloys; fabrication of metals and alloys.

O

OIL ENGINES

Continental Practice. Continental Oil Engine Practice, J. L. Chaloner. Gas & Oil Power, vol. 19, no. 217, Oct. 4, 1923, pp. 1–3. Professor Nägel's researches; port scavenging; M. A. N. and Sulzer systems; cooling; preheating of starting air; Professor Neumann's tests; mechanical injection; heat transmission.

Marine, British. New British Marine Oil Engines Developed. Mar. Eng., vol. 28, no. 9, Sept. 1923, pp. 566–568, 3 figs. Beardmore builds largest semi-Diesel ever installed in cargo vessel with 750 b. hp.; Richardsons, Westgarth & Co. modify Tosi engine.

Piston and Cylinder Lubrication. Operation of Marine Oil Engines, John Lamb. Inst. Mar. Engrs.—Trans., session 1923–1924, Aug. 1923, pp. 172–192 and (discussion) 192–205, 4 figs. Discusses lubrication of cylinders and pistons.

OIL FUEL

Burners. The Scarab-Coen Oil Burning System. Oil Eng. & Finance, vol. 4, no. 85, Aug. 25, 1923, pp. 212–214, 3 figs. System of mechanical oil burning which operates under low pressure; details of design; oil heater; duplex strainer.

Combustion in Diesel Engines. Liquid Fuels and Their Combustion in Diesel Engines (Flüssige Brennstoffe und ihre Verbrennung in der Dieselmaschine), Otto Alt. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 28, July 14, 1923, pp. 686–691, 13 figs. Review of knowledge on chemical and physical properties of fuels and of combustion process in Diesel engine; gives tables showing ignition temperatures required in engine for various fuels; apparently no gasification and no appreciable evaporation precede ignition; ignition point depends upon chemical constitution; all liquid fuels, including benzol, burn when the required ingition temperatures are reached.

Efficient Burning. Burning Liquid Fuel Efficiently, H. A. Anderson. Iron Trade Rev., vol. 73, no. 16, Oct. 18, 1923, pp. 1097–1098 and 1105. Type of burner and design of furnace principal factors in economical use of fuel oil; refractories, use of insulating brick, and condition of fuel also influence efficiency.

Industrial Power Plants. Oil as Fuel in Industrial Power Plant, Douglas Henderson. Power Plant Eng., vol. 27, no. 19, Oct. 1, 1923, pp. 974–976, 2 figs. How practical and economic considerations affect use and selection of fuel.

OPEN-HEARTH FURNACES

Compressed-Gas Firing. Compressed-Gas Firing of Open-Hearth Furnaces, Gerhard Donner. Iron & Coal Trades Rev., vol. 107, no. 2897, Sept. 7, 1923, p. 335, 3 figs. Also Foundry Trade Jl., vol. 28, no. 371, Sept. 27, 1923, p. 273, 3 figs. Describes tests carried out, and results obtained, on experimental 3-ton open-hearth furnace heated by compressed gas. Translated from Stahl u. Eisen.

Hoesch Process. Open-Hearth Process at the Hoesch Works, Otto Schweitzer. Iron & Coal Trades Rev., vol. 107, no. 2895, Aug. 24, 1923, pp. 255–256, 3 figs. Report to Steel-Works Committee of German Iron & Steel Inst. Translated from Stahl u. Eisen.

Lime vs. Limestone Practice. Lime vs. Limestone in Basic Open-Hearth Practice as Affecting Time Costs, Lewis M. Fulton. Iron & Steel of Can., vol. 6, no. 9, Sept. 1923, pp. 180–181. Comparison of material costs.

ORDNANCE

Testing Ground for. Aberdeen Proving Ground, Fred B. Fletcher. Iron Trade Rev., vol. 73, no. 16, Oct. 18, 1923, pp. 1091–1096, 7 figs. Vast laboratory covering 36,000 acres established in Maryland by U. S. Government, where explosives, projectiles, armor plate, guns and gun carriages, artillery mounts and other items of ordnance are tested prior to acceptance.

OXY-ACETYLENE WELDING

Overhead. Welding Over-Head with the Oxy-Acetylene Flame, C. J. Nyquist. Am. Welding Soc.—Jl., vol. 2, no. 8, Aug. 1923, pp. 13–14. Discussion of one of most difficult applications of oxy-acetylene welding.

Sheet Aluminum. The Autogenous Welding of Sheet Aluminium by the Oxy-Acetylene Process, A. Eyles. Machy. (Lond.), vol. 22, no. 574, Sept. 27, 1923, pp. 822–825, 19 figs. Aluminum welding fluxes; welding material; preparing metal for welding; power of blowpipes; execution of sheet-aluminum welding; treatment after welding.

Tanks. Welding Small Tanks by the Oxy-Acetylene Process. Acetylene Jl., vol. 25, no. 3, Sept. 1923, pp. 117–124, 20 figs. Welding practices; examples of tank welding; comparison of costs.

P

PAINTING

Air Brush. Cost of Paint Versus Cost of Painting, Howard W. Beach. Compressed Air Mag., vol. 28, no. 9, Sept. 1923, pp. 620–621, 4 figs. Use of modern air brush in painting cuts the total cost of the work in half.

PAINTS

Testing Films. Further Studies of the Physical Properties of Drying-Oil, Paint and Varnish Films, Harley A. Nelson and George W. Rundle. Am. Soc. Testing Matls., advance paper, no. 50, for meeting June 25–29, 1923, 13 pp., 6 figs. Discusses three aspects of testing of paint films.

PATTERNS

Large Castings. Large Pattern and Core Work on the Pacific Coast. Am. Mach., vol. 59, no. 15, Oct. 11, 1923, pp. 553–555, 7 figs. Method, used in making large pipe connections for turbine work, of building both patterns and cores with sand over skeleton

Manufactured by Advertisers — CLASSIFIED LIST OF MECHANICAL EQUIPMENT — Alphabetical List on page 166

Rope Drives
* Allis-Chalmers Mfg. Co.
* Brown, A. & F. Co.
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Link-Belt Co.
* Medart Co.
* Wood's, T. B. Sons Co.

Rubber Goods, Mechanical
* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* United States Rubber Co.

Sand Blast Apparatus
* De La Vergne Machine Co.

Saw Mill Machinery
* Allis-Chalmers Mfg. Co.

Saw Mills, Portable
* Frick Co. (Inc.)

Scales, Fluid Pressure
* Crosby Steam Gage & Valve Co.

Screens, Perforated Metal
* Hendrick Mfg. Co.

Screens, Revolving
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.
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Screens, Shaking
* Allis-Chalmers Mfg. Co.
Chain Belt Co.
* Gifford-Wood Co.
* Hendrick Mfg. Co.
Link-Belt Co.

Screens, Water Intake (Traveling)
Chain Belt Co.
Link-Belt Co.

Screw Cutting Dies
(See Dies, Thread Cutting)

Screw Machines, Hand
* Jones & Lamson Mch. Co.
* Warner & Swasey Co.

Screws, Cap
* Scovill Mfg. Co.

Screws, Safety Set
Allen Mfg. Co.
* Bristol Co.

Screws, Set
Allen Mfg. Co.

Separators, Ammonia
* De La Vergne Machine Co.
Elliott Co.
* Frick Co. (Inc.)
Milwaukee Steam Appliance Co.
* Vogt, Henry Machine Co.

Separators, Oil
* Crane Co.
* De La Vergne Machine Co.
Elliott Co.
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
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* Crane Co.
Elliott Co
* H. S. B. W.-Cochrane Corp'n
Hoppes Mfg. Co.
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
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* Brown, A. & F. Co.
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* Falls Clutch & Mchry. Co.
* Medart Co.
* Union Drawn Steel Co.
* Wood's, T. B. Sons Co.

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* Medart Co.

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* Gwilliam Co.

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Link-Belt Co.

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* McLeod & Henry Co.

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* Union Drawn Steel Co.

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Mackintosh-Hemphill Co.

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Mackintosh-Hemphill Co.

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* Hendrick Mfg. Co.

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* Scovill Mfg. Co.

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* Hendrick Mfg. Co.

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* Goodrich, B. F. Rubber Co.
* United States Rubber Co.

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Weber, F. Co. (Inc.)

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(See Stacks, Steel)

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(See Wire Rope Fastenings)

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* Poole Engrg. & Mach. Co.

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* Spray Engineering Co.

Sprays, Water
* Cooling Tower Co. (Inc.)
* Spray Engineering Co.

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* Spray Engineering Co.

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Philadelphia Gear Works

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* Hendrick Mfg. Co.
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New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Standpipes
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Morrison Boiler Co.
* Walsh & Weidner Boiler Co.

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* Davis, G. M. Regulator Co.
* Fulton Co.
* Kieley & Mueller (Inc.)
Lunkenheimer Co.
Milwaukee Steam Appliance Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Sarco Co. (Inc.)

Steel Alloy
Union Drawn Steel Co.

Steel, Bright Finished
Union Drawn Steel Co.

Steel, Cold Drawn
Union Drawn Steel Co.

Steel, Cold Rolled
Cumberland Steel Co.
Union Drawn Steel Co.

Steel, Nickel
Union Drawn Steel Co.

Steel, Open-Hearth
* Falk Corporation
Union Drawn Steel Co.

Steel, Rock Drill
* Ingersoll-Rand Co.

Steel, Screw, Cold Drawn
Union Drawn Steel Co.

Steel, Strip (Cold Rolled)
Driver-Harris Co.

Steel, Vanadium
Union Drawn Steel Co.

Steel Plate Construction
* Bigelow Co.
* Brownell Co.
* Burhorn, Edwin Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
* Keeler, E. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Stills
* Vogt, Henry Machine Co.

Stocks and Dies
* Curtis & Curtis Co.
* Landis Machine Co. (Inc.)

Stokers, Chain Grate
* Babcock & Wilcox Co.
* Combustion Engineering Corp'n
* Westinghouse Electric & Mfg. Co.

Stokers, Overfeed
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Westinghouse Electric & Mfg. Co.

Stokers, Underfeed
* American Engineering Co.
* Combustion Engineering Corp'n
* Detroit Stoker Co.
* Riley, Sanford Stoker Co.
* Sturtevant, B. F. Co.
* Westinghouse Electric & Mfg. Co.

Stools and Chairs, Metal
Manufacturing Equip. & Engrg. Co.

Strainers, Oil
* Bowser, S. F. & Co. (Inc.)
* Mason Regulator Co.

Strainers, Steam
* Kieley & Mueller (Inc.)
* Mason Regulator Co.

Strainers, Water
Elliott Co.
* Kieley & Mueller (Inc.)
* Mason Regulator Co.
* Schutte & Koerting Co.

Strainers, Water (Traveling)
Link-Belt Co.

Structural Steel Work
* Hendrick Mfg. Co.
* Walsh & Weidner Boiler Co.

Sugar Machinery
* Walsh & Weidner Boiler Co.

Superheaters, Steam
* Babcock & Wilcox Co.
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Locomotive)
* Power Specialty Co.
* Superheater Co.

Superheaters, Steam (Marine)
* Power Specialty Co.
* Superheater Co.

Switchboards
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Switches, Electric
* General Electric Co.
* Westinghouse Electric & Mfg. Co.

Synchronous Converters
(See Converters, Synchronous)

Synchroscopes
Weston Electrical Instrument Co.

Tables, Drawing
Dietzgen, Eugene Co.
Economy Drawing Table & Mfg. Co.
Keuffel & Esser Co.
ParVell Laboratories
Weber, F. Co. (Inc.)

Tachometers
* American Schaeffer & Budenberg Corp'n
* Bristol Co.
Veeder Mfg. Co.
Weston Electrical Instrument Co.

Tachoscopes
* American Schaeffer & Budenberg Corp'n

Tanks, Acid
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Ice
* Frick Co. (Inc.)
* Graver Corp'n

Tanks, Oil
* Graver Corp'n
* Hendrick Mfg. Co.
Morrison Boiler Co.
Nugent, Wm. W. & Co. (Inc.)
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Walsh & Weidner Boiler Co.

Tanks, Pressure
* Brownell Co.
* Graver Corp'n
* Hendrick Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Steel
* Bigelow Co.
* Brownell Co.
* Casey-Hedges Co.
* Cole, R. D. Mfg. Co.
* Graver Corp'n
* Hendrick Mfg. Co.
Morrison Boiler Co.
New Haven Boiler Works (Inc.)
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Union Iron Works
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Storage
* Brownell Co.
* Cole, R. D. Mfg. Co.
* Combustion Engineering Corp'n
* Graver Corp'n
* H. S. B. W.-Cochrane Corp'n
* Hendrick Mfg. Co.
Herbert Boiler Co.
Morrison Boiler Co.
Nugent, Wm. W. & Co. (Inc.)
* Scaife, Wm. B. & Sons Co.
* Titusville Iron Works Co.
* Vogt, Henry Machine Co.
* Walsh & Weidner Boiler Co.

Tanks, Tower
* Graver Corp'n
* Walsh & Weidner Boiler Co.

Tanks, Welded
* Cole, R. D. Mfg. Co.
* Graver Corp'n
Morrison Boiler Co.
* Scaife, Wm. B. & Sons Co.

Tap Extensions
Allen Mfg. Co.

Tapping Attachments
* Whitney Mfg. Co.

Temperature Regulators
(See Regulators, Temperature)

Testing Laboratories, Cement
* Smidth, F. L. & Co.

Textile Machinery
* Franklin Machine Co.

Thermocouples
Engelhard, Chas. (Inc.)

Thermometers
* American Schaeffer & Budenberg Corp'n
* Ashton Valve Co.
* Bristol Co.
* Sarco Co. (Inc.)
* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.

Thermometers, Chemical
* Tagliabue, C. J. Mfg. Co.

Thermometers, Distance
* Taylor Instrument Cos.

Thermometers, Electric Resistance
Engelhard, Chas. (Inc.)

Thermometers, High Range (Recording)
* Bailey Meter Co.
* Tagliabue, C. J. Mfg. Co.
* Taylor Instrument Cos.

Thermometers, Industrial
* Tagliabue, C. J. Mfg. Co.

Thermostats
* Bristol Co.
* Fulton Co.
* General Electric Co.

wooden frames to cheapen cost where but few castings are required.

Nickel-Plated Plates. Nickel Plated Production Pattern Plates, William H. Parry. Metal Industry (N. Y.), vol. 21, no. 9, Sept. 1923, p. 358. Method of overcoming difficulty of sand adherence.

Standardization. Pattern Standardization, E. S. Carman. Metal Industry (N. Y.), vol. 21, no. 10, Oct. 1923, pp. 400–401. Need for this work and possibilities of eliminating some of unseen wastes of foundry. (Abstract.) Bul. Am. Foundrymen's Assn.

PIGMENTS

White Paint, Optical Properties. Some Optical Properties of White Paint Pigments in the Ultra-Violet Spectrum, A. H. Pfund. Am. Soc. Testing Matls., advance paper, no. 51, for meeting June 25–29, 1923, 11 pp., 6 figs. Treats of certain properties of paint pigments in ultra-violet region of spectrum.

PIPE

Friction Losses. New Logarithmic Equation for Friction Losses in Pipes, F. W. Greve. Eng. News-Rec., vol. 91, no. 15, Oct. 11, 1923, p. 605. Formula devised with aid of reducing number of variables to minimum.

Reinforced, Stresses in. The Stresses in Pipes Reinforced by Steel Rings, Gilbert Cook. Engineering, vol. 116, no. 3015, Oct. 12, 1923, pp. 477–478, 2 figs. Investigation of conditions under which reinforced pipe may be made lighter than plain pipe even when no difficulties of welding would be encountered; conclusions regarding relation between spacing of rings and their effectiveness. Paper before Brit. Assn.

PLANERS

Herringbone-Gear. A New Herringbone Gear Planer, N. Leerberg. Am. Mach., vol. 59, no. 15, Oct. 11, 1923, pp. 561–563, 3 figs. Features of design proposed to overcome difficulties usually encountered; two tools cut simultaneously and move in helical path; work held stationary during cutting to give stability.

PLATES

Rectangular, Stresses in. Stress Distribution in a Rectangular Plate having two Opposing Edges Sheared in Opposite Directions, C. E. Inglis. Roy. Soc.—Proc., vol. 103, no. A723, July 2, 1923, pp. 598–610, 11 figs. Distributions obtained are apparently in close agreement with those experimentally determined by Prof. Coker.

PRESSES

Hydraulic. Hydraulic Plants: A Few General Considerations, H. S. Cattermole. Mech. World, vol. 74, no. 1914, Sept. 7, 1923, pp 145–146. Hydraulic plants for forging, riveting, shearing, baling, and other pressing operations are grouped in four types, each of which is discussed.

PRESSWORK

Car-Shop. Car Shop Press Work, L. C. Morrow. Am. Mach., vol. 59, no. 16, Oct. 18, 1923, pp. 571–574, 8 figs. Production limitations; multiple-punching operations on large work; heating diaphragms in "continuous" furnace and pressing them in 450-ton high-speed crankpress; time-saving devices.

PULVERIZED COAL

British Practice. Foreign Developments in Firing Pulverized Fuel, C. H. S. Tupholme. Power Plant Eng., vol. 27, no. 20, Oct. 15, 1923, pp. 1033–1036, 7 figs. Discusses use of powdered fuel with particular reference to British practice.

Plate-Heating Furnaces. Powdered Fuel For Furnace Work. Engineering, vol. 116, no. 3014, Oct. 5, 1923, pp. 425–426, 5 figs. partly on p. 424. Details of pulverized-coal installation for plate-heating furnace.

PUMPS

Deep-Well. A New Type of Deep Well Pump. Refrigeration, vol. 32, no. 6, July 1923, pp. 42–43, 5 figs. Water elevated by means of propeller similar to that employed for propelling ships. Advantages of Axilo pump.

PYROMETERS

Thermoelectric. Notes on Thermoelectric Pyrometers and Instructions for Their Use in Heat Treating Steel. Am. Soc. for Steel Treating—Trans., vol. 4, no. 3, Sept. 1923, pp. 410–430, 8 figs. Thermocouple or "fire-end"; leads from thermocouple to indicator or recorder; indicators and recorders; cold-junction compensation; installing pyrometers. Report of Sub-Committee—IV, on Pyrometry.

R

RAILS

Corrosion, Prevention of. Oiling Prevents Corrosion of Rail and Fixtures. Ry. Rev., vol. 73, no. 19, Sept. 15, 1923, pp. 377–378, 2 figs. Delaware Lackawanna & Western R. R. develops cheap and satisfactory way to prevent corrosion from salt drippings and other causes.

Manufacture. The Production of Iron and Steel for Railway Purposes, Cecil J. Allen. Ry. Engr., vol. 44, nos. 521, 523 and 524, June, Aug. and Sept., 1923, pp. 222–226, 309–313 and 344–349, 26 figs. Methods employed in manufacturing iron and steel constituents of railway track, structures and rolling stock. June: Rolling of steel rails and heavy sections. Aug.: Finishing, testing and inspection of steel rails. Sept.: Recent tests on basic open-hearth rails and method and results of Sandberg sorbitic treatment.

RAILWAY ELECTRIFICATION

Illinois Central, Chicago. Terminal Improvement and Electrification of the Illinois Central Railroad at Chicago, Daniel J. Brumley. Ry. Rev., vol. 73, no. 9, Sept. 1, 1923, pp. 299–303. Work now in progress involves extensive rearrangement of facilities in addition to change of motive power.

Melbourne, Australia. Suburban Electrification at Melbourne, Australia. Eng. News-Rec., vol. 91, no. 15, Oct. 11, 1923, pp. 600–602, 3 figs. Multiple-unit electric and steam main-line trains on same tracks of 145-mi., 1500-volt d. c. system completed in 1923; economic results; quicker service increases traffic and revenue.

RAILWAY MOTOR CARS

Diesel-Electric. Observations Made on the Use of Polar-Deva Diesel-Electric Motors on Swedish Railways (Constatations effectuées au cours d'un voyage d'études relatif à l'exploitation des chemins de fer à l'aide des automotrices Diesel-électriques Polar-Deva en usage en Suède), R. Jourdin. Revue Générale des Chemins de Fer, vol. 42, no. 3, Sept. 1923, pp. 187–202, 6 figs. Design, construction and operation of cars, including mechanical and electrical equipment, fuel consumption, cost data, etc.; looks upon Diesel-electric as a stepping-stone to complete electrification.

Electric. Motor Car and Trailer of the Stockholm Railway Company (Aktiebolaget Stockholms spårvagars nya motor-och slapvagnar), Gösta Lindman. Teknisk Tidskrift, vol. 53, no. 9, Mar. 3, 1923, pp. (Elektroteknik) 31–35, 9 figs. Details of design and construction of new rolling stock for overhead electric lines.

Gas-Electric-Battery. A Gas-Electric-Battery Car for Railway Service, R. J. Needham. Ry. Rev., vol. 73, no. 15, Oct. 13, 1923, pp. 535–539, 2 figs. Reserve capacity and provision against breakdowns combined with double-end control, regenerative braking and other special features.

Gasoline. Gasoline Motorized Coach for the C. & N. W. Ry. Age, vol. 75, no. 13, Sept. 29, 1923, pp. 585–587, 3 figs. Trial run shows practicability of synchronized double motor drive and double-end control.

Light Self-Propelled Gasoline Driven Motor Car. Ry. & Locomotive Eng., vol. 36, no. 10, Oct. 1923, pp. 305–306, 2 figs. Capacity for 41 passengers with baggage compartment.

Pneumatically Synchronized Engines. Two Pneumatically Synchronized Engines Used in New Railcar. Automotive Industries, vol. 49, no. 15, Oct. 11, 1923, pp. 749–751, 4 figs. Standard railway coach, adopted in preference to lighter automotive construction, requires more power than single stock unit will develop; clutches, gears and throttle controlled by air; brake compressor electrically driven.

Types. Railroad Motor Cars. Eng. Progress, vol. 4, no. 7, July 1923, pp. 125–128, 6 figs. Types; drive; power transmission; engine equipment.

RAILWAY OPERATION

Car Interchange. Interchange of Rolling Stock, Int. Ry. Congress—Bul., vol. 5, no. 8-9, Aug.-Sept. 1923, pp. 747–770. Discussion on interchange of freight cars and penalty charges in case of delay in return of that stock; rules to be adopted in relations between railways themselves; rules to be adopted in relations between railways and consignors and consignees.

Train Control. Automatic Train Control, W. J. Thorrowgood. Ry. Engr., vol. 44, no. 521, June 1923, pp. 128–220. Cost; comparative figures; need for automatic train control.

Automatic Train Control on Chicago & Alton R. R. Ry. Rev., vol. 73, no. 11, Sept. 15, 1923, pp. 379–384, 14 figs. Test section 14 mi. in length recently put in service between Normal and Lexington, Ill.

I. C. C. Report on Sprague Train-Control Tests on N. Y. C. Ry. Signaling, vol. 16, no. 9, Sept. 1923, pp. 367–369. Analysis of tests; it has been demonstrated that magnetic impulse can be transmitted in electrified territory from permanent track magnets to locomotive regardless of speed, oscillation, or weather conditions, and that such impulse will actuate locomotive apparatus to provide automatic brake application in practical manner. (Abstract.)

Train Control Device Tested by the Big Four. Ry. Elec. Engr., vol. 14, no. 9, Sept. 1923, pp. 269–272, 8 figs. Indiana Equipment Corp. demonstrates its apparatus in connection with freight-train service.

RAILWAY REPAIR SHOPS

Electrical Applications. Electrical Applications at the Transcona Shops, Alfred C. Turtle. Ry. Elec. Engr., vol. 18, no. 9, Sept. 1923, pp. 261–267, 17 figs. Canadian national railways make extensive use of electric energy; heat treatment with electric furnace.

Locomotive. A Straight Line Method for Locomotive Shops, Lawrence Richardson. Ry. Rev., vol. 73, no. 10, Sept. 8, 1923, pp. 339–345, 4 figs. Progressive system for classified repairs patterned after best industrial production practice.

Burlington Builds New Locomotive Shops. Ry. Age, vol. 75, no. 14, Oct. 6, 1923, pp. 611–615, 6 figs. Construction on new site of ample area at Denver affords opportunity for well-planned development.

RAILWAY SIGNALING

Automatic. Automatics on Paris Grande Ceinture, T. S. Lascelles. Ry. Signaling, vol. 16, no. 9, Sept. 1923, pp. 363–367, 12 figs. General types of French signals compared with new automatics.

The Automatic Signalling Between Marylebone and Wembley, Great Central Section, London & North Eastern Railway. Ry. Gaz., vol. 39, no. 10, Sept. 7, 1923, pp. 302–309, 16 figs. Describes new features and departures from precedent; how steam worked railway has all those safeguards and facilities hitherto only to be found on rapid-transit electrically operated lines.

Fog Repeater Signals. Signalling Apparatus on the Metropolitan Railway for Use in Foggy Weather and Snow, W. Challis. Ry. Engr., vol. 44, no. 522, July 1923, pp. 245–247, 7 figs. Describes fog repeater signals, which enable trains to run to time even in very dense fogs. (Abstract.)

Interlocking. Dynamic Indication for A. C. Power Interlockings. Ry. Engr., vol. 44, no. 521, June 1923, pp. 205–206 and 211, 3 figs. Describes how dynamic indication may be obtained for points and signals operated by alternating currents.

Train-Order and Interlocking. Train-Order Signals at Interlockers. Ry. Signaling, vol. 16, no. 9, Sept. 1923, pp. 360–362, 4 figs. Confusion eliminated by using interlocking signal as train-order signal.

RAILWAY TRACK

Crossings. An Analysis of the Various Methods Used for Calculating Dimensions for Points and Crossings, R. D. Walker. Ry. Engr., vol. 44, no. 523, Aug. 1923, pp. 314–315, 5 figs. Discusses four general methods, namely, (1) turnout curve tangential to main line and to crossing at theoretical point of crossing; (2) turnout curve tangential to switch at its heel and to crossing at theoretical point of crossing; (3) turnout curve tangential to main line and to wing rail of crossing at its toe; and (4) turnout curve tangential to switch at its heel and to wing rail of crossing at its toe.

Rail-Packing Machine. Machine for Packing the Rails. Eng. Progress, vol. 4, no. 7, July 1923, p. 145, 2 figs. Machine consists of air pump driven by 4-stroke combustion motor and of packing tool.

RAILWAY YARDS

Electric Switching Dummy. Accumulator Motor Truck with Capstan for Shunting Purposes. Eng. Progress, vol. 4, no. 8, Aug. 1923, p. 173, 4 figs. Describes small motor truck for shunting purposes on factory sidings, designed by Brown, Boveri & Co., Mannheim.

REDUCTION GEARS

Calculation. Calculation of High-Speed High-Power Gears (Calcul des engrenages à grande vitesse et pour grande puissance), Alb. Schlag. Revue Universelle des Mines, vol. 18, no. 5, Sept. 1, 1923, pp. 321–344, 10 figs. Gears for speed reduction, their calculation and construction, including dimensions of pinions; profile, types and angle of teeth; recommends 30-deg. angle.

REFRIGERANTS

Natural-Gas Gasoline as. The Use of Highly Volatile Natural Gas Gasoline as a Refrigerant, L. D. Wyant. U. S. Bur. of Mines—Reports of Investigations, no. 2510, Aug. 1923, 10 pp. Experiments indicate that volatile gasoline can be used to advantage in many refrigerating plants.

REFRIGERATION

Packing-House. Refrigeration in the Packing House, H. J. Macintire. Southern Engr., vol. 40, no. 1, Sept. 1923, pp. 39–41, 2 figs. Refrigeration required and temperatures used with various products.

RESEARCH

Iron Industry. Scientific Research in the Iron Industry (Wissenschaftliche Forschung in der Eisenindustrie), P. Goerens. Stahl u. Eisen, vol. 43, no. 37, Sept. 13, 1923, pp. 1191–1199, 10 figs. The relation of research to development of iron industry; its purpose, costs and benefits; the necessity of comprehensive industrial research, and coördination between industrial research bureaus, investigating committees, iron-research institutes and colleges. Editorial comment.

ROLLING MILLS

Drives. Adjustable Speed Main Roll Drives, A. K. Bushman. Gen. Elec. Rev., vol. 26, no. 10, Oct. 1923, pp. 681–687, 7 figs. Discusses advantages and disadvantages of various methods of obtaining adjustable speed control of main rolls used in manufacture of steel; compares relative merits of a.c. and d.c. systems.

Drives, Flywheels for. Flywheels for Steel Mill Drives, L. A. Umansky. Gen. Elec. Rev., vol. 26, no. 19, Oct. 1923, pp. 688–707, 21 figs. Considers character of rolling-mill load; energy of flywheels; characteristics of induction motors; effect on motor size; cost of operating flywheels; etc. Flywheel calculations.

Electric Control. The Electrical Control for a Hot Strip Mill, M. J. Wohlgemuth. Elec. Jl., vol. 20, no. 9, Sept. 1923, pp. 322–325, 9 figs. Describes control arrangements at plant of West Leechburg Steel Co.

Electrically Driven. Electric Drive of Reversing Mill, C. B. Huston. Elec. World, vol. 82, no. 12, Sept. 22, 1923, pp. 577–580, 7 figs. Third in same plant to be converted from steam drive; rolling requirements; special features embodied in main mill motor; provisions for starting reversing and regulating load.

"Motorizing" the 33-inch Structural Mill at the Homestead Steel Works, S. S. Wales. Gen. Elec. Rev., vol. 26, no. 10, Sept. 1923, pp. 662–668, 7 figs. Shows results obtained by substituting electric motor for steam engine.

Manufactured by Advertisers

CLASSIFIED LIST OF MECHANICAL EQUIPMENT

Alphabetical List on page 166

Thread Cutting Tools
* Crane Co.
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* Landis Machine Co. (Inc.)

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* Landis Machine Co. (Inc.)

Tie Tamping Outfits
* Ingersoll-Rand Co.

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* Bristol Co.

Tinsmiths' Tools and Machines
* Niagara Machine & Tool Works

Tipples, Steel
Link-Belt Co.

Tobacco Machinery
* American Machine & Foundry Co.

Tongs, Crane
* Kenworthy, Chas. F. (Inc.)

Tools, Brass-Working Machine
* Warner & Swasey Co.

Tools, Machinists' Small
* Atlas Ball Co.

Tools, Pneumatic
* Ingersoll-Rand Co.

Tools, Special
DuPont Engineering Co.

Torches, Hand
* Best, W. N. Corp'n

Track, Industrial
Northern Engineering Works

Tractors
* Allis-Chalmers Mfg. Co.

Tractors, Industrial (Storage Battery)
* Yale & Towne Mfg. Co.

Tractors, Turntable
* Whiting Corp'n

Trailers, Industrial
* Yale & Towne Mfg. Co.

Tramrail Systems, Overhead
* Brown Hoisting Machinery Co.
Link-Belt Co.
Northern Engineering Wks.
Reading Chain & Block Corp'n
* Whiting Corp'n

Tramways, Bridge
Link-Belt Co.

Tramways, Wire Rope
Clyde Iron Works Sales Co.
Lidgerwood Mfg. Co.
* Roebling's, John A. Sons Co.

Transfer Tables
* Whiting Corp'n

Transformers, Electric
* Allis-Chalmers Mfg. Co.
* General Electric Co.
* Westinghouse Electric & Mfg. Co

Transmission Machinery
(See Power Transmission Machinery)

Transmissions, Automobile
* Foote Bros. Gear & Machine Co.

Transmissions, Variable Speed
* American Fluid Motors Co.

Traps, Radiator
* American Radiator Co.
* Sarco Co. (Inc.)

Traps, Return
* American Blower Co.
* Crane Co.
* Kieley & Mueller (Inc.)

Traps, Steam
* American Blower Co.
* American Schaeffer & Budenberg Corp'n
* Crane Co.
* Davis, G. M. Regulator Co.
Elliott Co.
* Jenkins Bros.
Johns-Manville (Inc.)
* Kieley & Mueller (Inc.)
Milwaukee Steam Appliance Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Sarco Co. (Inc.)
* Schutte & Koerting Co.
* Vogt, Henry Machine Co.

Traps, Vacuum
* American Blower Co.
* American Schaeffer & Budenberg Corp'n
* Crane Co.
* Sarco Co. (Inc.)

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* United States Rubber Co.

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Reading Chain & Block Corp'n
* Whiting Corp'n

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Trucks, Trailer
* Yale & Towne Mfg. Co.

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* Casey-Hedges Co.

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* Scovill Mfg. Co.
* Wheeler Condenser & Engrg. Co.

Tubes, Pitot
Bacharach Industrial Instrument Co.

Tubes, Pyrometer Protection
Engelhard, Chas. (Inc.)

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* United States Rubber Co.

Tubing, Rubber (Hard)
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Tumbling Barrels
Northern Engineering Works
* Royersford Fdry. & Mach. Co.
* Whiting Corp'n

Turbines, Hydraulic
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Smith, S. Morgan Co.
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* Allis-Chalmers Mfg. Co.
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* De Laval Steam Turbine Co.
* General Electric Co.
* Kerr Turbine Co.
Ridgway Dynamo & Engine Co.
* Sturtevant, B. F. Co.
* Terry Steam Turbine Co.
* Westinghouse Elec. & Mfg. Co.

Turbo-Blowers
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* Ingersoll-Rand Co.
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* General Electric Co.
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* Terry Steam Turbine Co.
* Westinghouse Electric & Mfg. Co.

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* Coppus Engineering Corp'n
* Kerr Turbine Co.
* Terry Steam Turbine Co.
* Wheeler Condenser & Engineering Co.

Turret Machines
(See Lathes, Turret)

Turntables
Link-Belt Co.
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* Whiting Corp'n

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* Edward Valve & Mfg. Co.
Lunkenheimer Co.
* Pittsburgh Valve, Fdry. & Const. Co.
* Vogt, Henry Machine Co.

Unloaders, Air Compressor
* Ingersoll-Rand Co.
* Worthington Pump & Machinery Corp'n

Unloaders, Ballast
Lidgerwood Mfg. Co.

Unloaders, Car
Link-Belt Co.

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(See Pans, Pumps, Traps, etc., Vacuum)

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* Goodrich, B. F. Rubber Co.
* Jenkins Bros.
* Reading Steel Casting Co. (Inc.)
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* United States Rubber Co.

Valves, Air, Automatic
* Davis, G. M. Regulator Co.
* Fulton Co.
* Jenkins Bros.
* Simplex Valve & Meter Co.
* Smith, H. B. Co.

Valves, Air, Relief
* American Schaeffer & Budenberg Corp'n
* Fulton Co.
Lunkenheimer Co.
* Nordberg Mfg. Co.
* Schutte & Koerting Co.

Valves, Altitude
* Simplex Valve & Meter Co.

Valves, Ammonia
* American Schaeffer & Budenberg Corp'n
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* De La Vergne Machine Co.
* Jenkins Bros.
Lunkenheimer Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Vilter Mfg. Co.
* Vogt, Henry Machine Co.

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* Crane Co.
* Davis, G. M. Regulator Co.
* Edward Valve & Mfg. Co.
* H. S. B. W.-Cochrane Corp'n
* Jenkins Bros.
* Kieley & Mueller (Inc.)
* Pittsburgh Valve, Fdry. & Const. Co.
* Reading Steel Casting Co. (Inc.)
(Pratt & Cady Division)
* Schutte & Koerting Co.

Valves, Balanced
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The Consett Iron Company. Iron & Coal Trades Rev., vol. 107, no. 2893, Aug. 10, 1923, p. 191, 2 figs. Details of new electrical rolling mills, consisting of 40-in. slabbing mill, 42-in. plate mill, 32-in. light plate mill, and chequer-plate mill.

Plate. New Plate Mill at Blochairn Works, Glasgow. Iron & Coal Trades Rev., vol. 107, no. 2899, Sept. 21, 1923, pp. 435–437, 5 figs. New mill consists of two stands of 8-ft. by 32-in. rolls, driven by three-crank reversing engine.

Strip Steel. Strip Requirements Are Exacting, R. H. Ingraham. Iron Trade Rev., vol. 73, no. 16, Oct. 18, 1923, pp. 1103–1105. Various steps in process of manufacturing hot and cold-rolled product; causes of and remedies for many defects; important factors.

S

SAND, MOLDING

Cohesiveness Testing. Sand Conservation and Reclamation Tests Using the Doty Cohesiveness Testing Machine, R. F. Harrington, W. L. MacComb and M. A. Hosmer. Foundry Trade Jl., vol. 28, no. 366, Aug. 23, 1923, pp. 153–156, 3 figs. Enumeration of inconsistencies which authors' investigations have indicated. Summary of results of tests. (Abstract.) Paper presented before Am. Foundrymen's Assn.

Permeability. Moulding Sand Permeability. Metal Industry (Lond.), vol. 23, no. 13, Sept. 28, 1923, pp. 268–269, 1 fig. Apparatus and method for testing permeability of molding sands due to joint committee of Am. Foundrymen's Assn. and Nat. Research Council on molding sand investigation.

Preparation and Handling. The Mechanical Handling and Preparation of Sands, H. M. Lane. Foundry Trade Jl., vol. 28, no. 370, Sept. 20, 1923, pp. 242–245, 9 figs. Preparation of both facing and backing sand; selection of new sand; equipment used for handling. Paper presented to Paris Foundry Congress.

Treatment. A Modern Sand Plant in Germany (Une sablerei moderne en Allemagne), L. and R. Bonnaud. Fonderie Moderne, vol. 17, Sept. 1923, pp. 302–309, 7 figs. Describes equipment and methods in automatic plant producing foundry sand; notes on French practice; preparation of sand.

SCREW THREADS

Standardization, Germany. Introduction of Thread Standardization in Germany (Die Durchfuhrung der Gewindenormung in Deutschland), G. Schlesinger. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 25, June 23, 1923, pp. 749–754, 19 figs. Development of standards; Whitworth and metric unit thread standards; tolerances; templets.

SEAPLANES

Navy-Wright Racer. The Navy-Wright Racer for the Schneider Cup. Aviation, vol. 15, no. 13, Sept. 24, 1923, p. 365, 1 fig. Racing seaplane built by Wright Aeronautical Corp. has wing spread of 28 ft., height of 11 ft. 7¼ in., and length of 28 ft. 4¼ in.; on trial trip it averaged more than 180 mi. per hr. over 2½-mi. course; equipped with high-compression 700-hp. 12-cycle Vee-type water-cooled engine.

SHEARS

Rotary Plate. Self-contained Hydraulic Tools. Machy. (Lond.), vol. 22, no. 574, Sept. 27, 1923, pp. 813–816, 7 figs. Rotary shearing machine for ½-in. plates.

SOLDERING

Materials, Technology of. The Technology of Soldering Materials. Chem. Trade Jl. & Chem. Engr., vol. 73, no. 1891, Aug. 17, 1923, pp. 185–186. Review of modern progress.

STANDARDIZATION

Needs and Limitations. Standardization Is the Salvation of American Industry, Frank B. Gilbreth. Chem. Age (N. Y.), vol. 31, no. 9, Sept. 1923, pp. 385–386. Need of standardization; superstandardization; standardization in Europe; significance of standardization. See also article by Albert M. Whitney on Limitations on Standardization, pp. 387–388.

Soc. Automotive Engrs. Tentative Standardization Work. Soc. Automotive Engrs.—Jl., vol. 13, no. 4, Oct. 1923, pp. 339–343, 4 figs. Use of both bilateral and unilateral systems of expressing tolerances proposed; recommends adoption of standard brake test; revised molding standards proposed.

Trend of. The Trend of Standardization, George K. Burgess. Am. Soc. Testing Matls.—advance paper, no. 1, for meeting June 25–29, 1923, 10 pp. Discusses agencies at work in field of standardization, their inter-relations and what they are trying to accomplish; relation of research to standardization.

United States. Progress of Standardization in the United States, Warren R. Roberts. Min. Congress Jl., vol. 9, nos. 9 and 10, Sept. and Oct. 1923, pp. 322–325 and 362. List of organizations which are now and have been carrying on work along standardization lines; reports on standardization received by author from technical societies.

STEAM

Steam-Air Mixtures. A New Diagram for Steam-Air Mixtures (Ein neues Diagramm für Dampfluftgemische), R. Mollier. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 36, Sept. 8, 1923, pp. 869–872, 5 figs. Points out that in practical applications of steam-air mixtures the water vapor can always be treated as a complete gas; principle of calculation is then very simple; new diagram and its application to processes of drying and water recooling.

STEAM ACCUMULATORS

Principles and Types. The Importance of Different Types of Steam Accumulators in the Conservation of Power (Die Bedeutung verschiedener Speicherformen für die Energiewirtschaft), H. Pauer. Wärme, vol. 46, nos. 31, 32 and 33, Aug. 3, 10 and 17, 1923, pp. 341–345, 355–358 and 367–369, 12 figs. Causes of fluctuations between power supply and demand; losses occurring with seasonal short fluctuations; thermal principles of different storage systems; comparison between Ruths and feed-space accumulators.

STEAM-ELECTRIC PLANTS

Barbadoes Island, Pa. Barbadoes Island Plant Illustrates Modern Central Station Design. Power Plant Eng., vol. 27, no. 19, Oct. 1, 1923, pp. 965–973, 12 figs. Electrified auxiliaries, double-effect evaporators, motor-operated valves, starting bus for motors, and loop system of boiler feed are features of design.

Edinburgh, Scotland. Edinburgh's New Power Station. Elec. Ry. & Tramway Jl., vol. 49, no. 1197, Aug. 10, 1923, pp. 73–80, 8 figs. First section of new station at Portobello opened. Administration of development and details of station.

STEAM GENERATORS

Electric. Using Excess Power to Save Coal, E. H. Horstkotte. Indus. & Eng. Chem., vol. 15, no. 9, Sept. 1923, pp. 913–914, 1 fig. Electric generation of steam for heating and process work.

STEAM PIPE

High-Temperature Steam. Piping for High-Temperature Steam (Conduites de vapeur à haute température), Luc Denis. Société d'Encouragement pour l'Industrie Nationale—Bul., vol. 135, no. 5, May 1923, pp. 328–338, 4 figs. Conduction of superheated steam; piping and joints for purpose; arrangement of systems of pipe lines; examples.

STEAM POWER PLANTS

Auxiliaries. Steam Plant Auxiliaries, C. D. Gray and M. M. Samuels. Elec. World, vol. 82, no. 15, Oct. 13, 1923, pp. 749–753, 6 figs. Discusses methods of switching and grouping auxiliaries; arrangements for insuring continuity of service; typical installations; choice of voltage and house-service supply.

Oil-Burning. Power Plant Equipped to Burn Fuel Oil. Ry. Mech. Engr., vol. 97, no. 9, Sept. 1923, pp. 621–622, 3 figs. Flexible boiler operation and labor saving secured by burning oil in enginehouse power plant.

STEAM TRAPS

Installation and Operation. Steam-Trap Installation and Operation, R. N. Robertson. Power, vol. 58, no. 15, Oct. 9, 1923, pp. 573–576, 7 figs. Gives logical reasons for erratic behavior of steam traps and clarifies misunderstandings and rule-of-thumb methods employed.

STEAM TURBINES

Disks, Design of. The Design of Rotating Discs, G. Arrowsmith. Engineering, vol. 116, no. 3014, Oct. 5, 1923, pp. 417–419, 4 figs. In method outlined mathematical accuracy of original solution of Stodola has been maintained, but equations have been so transposed that disks of any reasonable contour can be treated.

Leaving Losses, Reduction of. Devices to Reduce Leaving Losses in Steam Turbines, Ivor R. Cox. Beama, vol. 13, no. 65, Sept. 1923, pp. 175–181, 6 figs. Points out that in order to increase leaving area without increasing blade stress it is necessary to depart from parallel blade and adopt blade the section of which is larger at root than at tip.

Vibration in, Correction of. Correcting Vibration in Reaction Type Turbines, L. Long. Power, vol. 58, no. 16, Oct. 16, 1923, pp. 609–612, 2 figs. Checking a sprung motor; checking trueness of coupling flanges; determining whether vibration is in turbine or generator; other recommendations.

STEEL

Alloy. See ALLOY STEELS.

Chrome-Nickel. See CHROME-NICKEL STEEL

Elastic Limit. The True and Apparent Elastic Limit of Steel, M. L. Fraichet. Iron & Coal Trades Rev., vol. 107, no. 2896, Aug. 31, 1923, p. 302. Results of tests carried out on wide variety of steels. Translated from Revue de Métallurgie.

Endurance Tests. Endurance Properties of Steel: Their Relation to Other Physical Properties and to Chemical Composition, D. J. McAdam, Jr. Am. Soc. Testing Matls.—advance paper, no. 19, for meeting June 25–29, 1923, 46 pp. 25 figs. Results of endurance tests at U. S. Nav. Eng., Experiment Station on carbon and alloy steels; repeated impact tests were made on machine which is described, as result of which, relationship of repeated impact to single impact and to endurance properties is indicated by graphs.

Fracture. Oblique Fracture and Flake Formation (Schieferbruch und Flockenbildung), Franz Rapatz. Stahl u. Eisen, vol. 43, no. 37, Sept. 13, 1923, pp. 1199–1202, 3 figs. Review of data contained in literature up to end of 1921, from which it is shown that no satisfactory explanation exists as to causes of flakes, and there is diversity of opinions regarding preventive measures.

Noteworthy Fractures (Bemerkenswerte Bruchererscheinungen), Richard Baumann. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 39–40, Sept. 29, 1923, pp. 945–947, 24 figs. It is shown that elongation of structure is observable even after breaking at red heat, when followed quickly by cooling; results of tensile tests on highly heated steel wires; observations on dented water pipes; fractures caused by excessive stress and by rapid change of temperature; influence of rapid increase in pressure in fractures of hollow cylinders.

High-Speed. See STEEL, HIGH-SPEED.

Ingots, Solidification of. Macrographic Study of Solidification of Steel Ingots (Sur l'étude macrographique du refroidissement des lingots d'acier), J. Descolas and E. Pretet. Revue de Métallurgie, vol. 20, no. 9, Sept. 1923, pp. 597–606, 12 figs. Relative importance of peripheral and central zones; effect of velocity of cooling after pouring; propagation of solidification in interior of ingot.

Internal Strains. Internal Strains in Cold Worked, Cold Pressed or Cold Bent Carbon Steel, W. J. Merten. West. Machy. World, Sept. 1923, vol. 14, no. 9, pp. 285–286 and 289, 7 figs. Points out that timely and judicious application of annealing for relieving of internal strains, accompanied by proper design of drawing dies and proper clearance, are all important to cold, deep drawing practice.

Specifications. Report of Committee A-1 on Steel. Am. Soc. for Testing Matls.—advance paper, no. 7, for meeting June 25–29, 1923, 39 pp., 29 figs. Recommendations affecting standards and tentative standards; recommendations for steel rails and accessories, structural steel, steel castings, steel tubing and pipe, boiler steel; methods of chemical analysis and physical tests; commercial bar steels, plate tolerances, steel for welding. Proposed revisions in standards. Report on ladle test ingot investigation; proposed specifications for steel castings and steel plate.

Sulphur in. Summarizes Work on Sulphur in Steel. Iron Trade Rev., vol. 73, no. 15, Oct. 11, 1923, pp. 1023–1024. Abstract of committee report outlining progress made and summarizing investigations planned by joint committee.

Temperature, Effect on Properties. The Effect of Temperature on Some of the Properties of Steel, H. R. A. Mallock. Roy. Soc.—Proc., vol. 103, no. A720, Apr. 3, 1923, pp. 1–7, 9 figs. Results of experiments now in progress at Davy-Faraday laboratory, on effect of temperature on elastic coefficient of solids.

Tensile Strength. Effect of Temperature on the Tensile Strength of Steel. Ry. & Locomotive Eng., vol. 36, no. 10, Oct. 1923, pp. 307–308, 1 fig. Presents table showing results of series of investigations on ten steels of different carbon and manganese content.

Tests, Magnetic. Magnetic Testing of Steel (Essai magnétique des aciers à la traction. Limites élastiques), L. Fraichet. Revue de Métallurgie, vol. 20, no. 8, Aug. 1923, pp. 549–559, 13 figs. Results of tests made; apparatus used; elastic limits; etc.

STEEL CASTINGS

Heat Treatment. Steel Castings Viewed Through the Microscope, M. G. Dumas. Ry. Rev., vol. 73, no. 13, Sept. 29, 1923, pp. 456–462, 17 figs. Fundamentals underlying scientific heat treatment of plain carbon steel castings.

Modern Trend. Outline Steel Casting Trend, Edgar A. Custer. Foundry, vol. 51, no. 19, Oct. 1, 1923, pp. 789–791. Green sand molds, rammed hard, becoming more widely used; rigid and accurately machined flasks and equipment aid; field pointed out for making castings in dry sand cores.

STEEL, HEAT TREATMENT OF

Automobile Steels. Automobile Steels and their Heat Treatment, P. A. Shaw. Eng., Production, vol. 6, no. 133, Oct. 1923, pp. 418–420, 2 figs. Effects of different elements in steel when treated; operations of normalizing, annealing, carburizing, hardening, and tempering.

Hardening. The Hardening of Steel, Zay Jeffries and R. S. Archer. Am. Soc. for Steel Treating—Trans., vol. 4, no. 3, Sept. 1923, pp. 263–304, 7 figs. Gives general definition of hardness, general theory of hardening of metals, and detailed conception of nature of hardened steel and of causes for its hardness.

Ingot Structure. Ingot Structure and Heat Treatments, B. D. Sakalatwalla. Iron Age, vol. 112, no. 13, Sept. 27, 1923, pp. 815–816. Importance of controlling former as aid to latter; possible effect of electromagnetic treatment during solidification.

Long-Time Drawing, Effect of. Heat-Treated Steel Parts in Service, George K. Elliott. Iron Age, vol. 112, no. 31, Sept. 27, 1923, pp. 810–811. Effect of long-time drawing conditions or further heat treatment under use; stability of steel.

Magnetic Inspection. A New Method of Magnetic Inspection, A. V. de Forest. Am. Soc. Testing Matls.—advance paper, no. 22, for meeting June 25–29, 1923. 12 pp., 6 figs. Rapid method of nondestructive test and inspection has been developed; by suitable combination of two independent magnetic readings, it is possible to determine different effects of two different factors entering into treatment of steel; method has been applied to study of different magnetic effects of quenching and drawing processes on 1-per cent tool steel and 18-per cent tungsten high-speed steel.

Quenching, Effect of. The Effect of Quenching from above the Carbide Transition Temperature upon the Magnetism of Steel, A. A. Dee. Roy. Soc.—Proc., vol. 104, no. A725, Sept. 1, 1923, pp. 316–321, 4 figs. Results of experiments indicate that quenching does not suppress transformation.

Variations in Volume Undergone by Hollow Steel Objects when Quenched (Variations de capacité accompagnant les traitements thermiques des corps creux en acier), Albert Portevin. Comptes Rendus, des Séances de l'Académie des Sciences, vol. 176, no. 13, Mar. 26, 192?, pp. 897–902. Changes in volume of cavity in 75-mm. steel shell caused by

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quenching is given in table, which shows that method of quenching is of great importance; repetition of treatment causes continued growth, which appears to be due to tendency to assume spherical form.

Tool Steel. Activity of Sub-Committee—I, on Recommended Practice for Treatment of Tool Steel during 1922–23. Am. Soc. for Steel Treating, vol. 4, no. 3, Sept. 1923, pp. 397–406. Recommended practice in heat treatment of plain carbon tool steel and in heat treatment of 18-per cent tungsten high-speed steel.

STEEL, HIGH-SPEED

Effect of Heat Treatment on Properties. The Effect of Heat Treatment on Lathe Tool-Performance and Some Other Properties of High-Speed Steels, H. J. French, Jerome Strauss and T. G. Diggs. Am. Soc. for Steel Treating, vol. 4, no. 3, Sept. 1923, pp. 353–396, 10 figs. Deals with time-temperature relation in hardening and tempering of high-speed steels and their effects upon lathe-tool performance, constitution and dimensional changes. Comparisons of "Taylor" and "breakdown" tests for lathe tools; consideration of prevention and elimination of so-called "flaky fractures" in heat treatment of high-speed steels.

Hardening. Hardening High-Speed Steel, W. B. Sullivan. Forging—Stamping—Heat Treating, vol. 9, no. 9, Sept. 1923, p. 375. Method developed by Chrobaltic Tool Co., Chicago, consists of heating tool in protected atmosphere to predetermined time and temperature, cooling in most appropriate manner and drawing at predetermined time and temperature.

Hardness after Quenching. Secondary Hardness of High-Speed Steel Heated After Quenching (Sur la "dureté secondaire" de l'acier rapide chauffé après la Trempe), G. Z. Nesselstraus. Revue de Métallurgie, vol. 20, no. 4, Apr. 1923, pp. 174–180, 13 figs. Series of chromium steels containing tungsten or cobalt, tungsten steel, and two carbon steels were studied by means of thermal analysis, hardness measurement, and microscopic examination; results.

STEEL MANUFACTURE

Converters. Practical Problems in the Operation of Large and Small Bessemer Converters (Praktische Betriebsfragen aus der Gross- und Kleinbessemerei), Huber Hermanns. Giesserei-Zeitung, vol. 20, nos. 16 and 17, July 15 and Aug. 1, 1923, pp. 297–300 and 325–327, 9 figs. Electric drive of converters; problems of transport; conveyance of pig iron and steel; foundry equipment.

STEEL WORKS

D. C. Power Generation. Direct-current Power Generation for Steel Plant Loads, Ernest Pragst. Gen. Elec. Rev., vol. 26, no. 10, Oct. 1923, pp. 672–677, 6 figs. Analyzes pros and cons of various methods of obtaining adequate amount of a.c. power for operating auxiliary drives, and makes recommendations to suit different needs.

STREET RAILWAYS

Cars, Worm-Drive. New Worm Drive Tramcar, Aera, vol. 12, no. 2, Sept. 1923, pp. 175–179, 2 figs. Hull Corporation Tramways has built a double-deck car incorporating automobile type of drive, with split axles, suspended motors, and other novel features.

SUPERHEATERS

Multi-Flow. Multi-Flow Steam Superheaters. Engineer, vol. 136, no. 3536, Oct. 5, 1923, pp. 376–377, 6 figs. Improved form of double-flow superheater, specially designed for use in downtake at rear of Lancashire and Galloway boilers.

SURGE TANKS

Mathematical Analysis. An Analysis of the Surge Tank of Constant Area and Unlimited Height, H. W. Coultas. Beama, vol. 13, no. 66, Oct. 1923, pp. 233–240, 5 figs. Mathematical analysis based on curves showing flow in tunnel, friction head, acceleration head and level in surge tank against time.

T

TEMPERATURE CONTROL

Apparatus. Temperature Control Apparatus (Note sur un 'contrôleur de température), Alfred Guy. Société d'Encouragement pour l'Industrie Nationale —Bul., vol. 135, no. 5, May 1923, pp. 341–345, 3 figs. New patent device in which heat is automatically cut off on reaching a different temperature; gives various examples of application, such as electric irons gas heaters, metal furnaces.

TEMPERATURE MEASUREMENT

Heated Walls. The Course of Temperature in Heated Walls of any Given Form (Temperaturverlauf in geheizten Wandungen von beliebiger Form), J. Geiger. Zeit. des Vereines deutscher Ingenieure, vol. 67, no. 37, Sept. 18, 1923, pp. 905–908, 11 figs. Describes simple and practical method of determining temperature in heated walls of any form, thickness or shape.

TERMINALS, RAILWAY

Design. Design of Railway Terminal Stations, Alfred Fellheimer. Contract Rec., vol. 37, no. 35, Aug. 29, 1923, pp. 844–846. Essential consideration concerned in efficient station layout; anticipation of electrification; coördination of long- and short-haul traffic.

TESTING MACHINES

Hardness. Testing of Steel for Hardness, H. M. German. Am. Soc. for Steel Treating—Trans., vol. 4, no. 3, Sept. 1923, pp. 329–341, 5 figs. Deals with most important factors and elements that introduce errors in operation of Brinell, and Rockwell machines and scleroscope.

TESTS AND TESTING

Methods. Report of Committee E-1 on Methods of Testing. Am. Soc. for Testing Matls.—advance paper, no. 4, for meeting June 25–29, 1923, 36 pp., 14 figs. Classification of testing methods; tentative methods; revision of standard methods of mechanical testing of metallic materials; suggested methods of tension testing of metallic materials; proposed tentative definitions of terms relating to methods of testing; and for verification of testing machines.

TEXTILE MACHINERY

Speed Control. Mechanical and Electrical Speed Control, C. T. Guildford. Textile World, vol. 64, no. 9, Sept. 1, 1923, pp. 79–82, 6 figs. Combination for tandem drives on cloth-finishing machines; alternating current motors and control, with automatic electrically operated mechanical variable speed transmission at plant of Rockland Bleach & Dye Works Co., Brooklandville, Md. Saving in labor and increased production.

THERMOMETERS

Remote-Reading. Distance Thermometers for Temperatures Below 700 Degrees (Rationella distanstermometrar för temperaturer under 700°), C. H. Marell. Teknisk Tidskrift, vol. 53, no. 10, Mar. 10, 1923, pp. (Allmänna Avdelningen) 73–74, 5 figs. Describes expansion thermometers (solid, liquid and gas), also thermoelectric, and resistance types.

Specifications. Report of Committee D-15 on Thermometers. Am. Soc. Testing Matls., advance paper, no. 71, for meeting June 25–29, 1923, 12 pp. Proposed specifications for A.S.T.M. partial immersion thermometers and for A.S.T.M. thermometers for use with Saybolt viscosimeter.

TIRES, RUBBER

Cord. Weftless Cord Tire Construction. India Rubber World, vol. 68, no. 6, Sept. 1, 1923, pp. 759–761, 2 figs. New weftless textile product yielding more fabric yardage per lb. of cotton, more homogeneous, resilient and wear-resisting carcass at less cost.

Fire Apparatus. Some Experiences with Fire Apparatus Tires, W. Russell. Fire & Water Eng., vol. 74, no. 10, Sept. 5, 1923, pp. 445–446. Climatic conditions and kind of apparatus in use govern type of tire most suitable; average life of tires depends on conditions.

Low-Pressure. Low Pressure Tyres. Auto-Motor Jl., vol. 28, no. 38, Sept. 20, 1923, p. 797, 4 figs. Particulars of new Dunlop big air tires.

TOOL MAKING

Master-Plate Method. The Master Plate in Press Tool Making, W. Richards. Machy. (Lond.), vol. 22, no. 571, Sept. 6, 1923, pp. 717–720, 11 figs. Examples of master plates and their application.

TRACTORS

Peat-Soil-Breaking. Tractor and Plow Usage in the First Breaking of Peat Land, J. Lyman Larson. Soc. Automotive Engrs.—Jl., vol. 13, no. 4, Oct. 1923, pp. 285–292 and (discussion) 292–295, 28 figs. Tract comprising several acres of "tamarack" swamp, drained with tile and cleared of stumpage was utilized to obtain accurate information regarding tractor and plowing equipment required for heavy operations of first breaking of peat soil, 5 to 7 ft. deep; equipment used and procedure.

"Super-Sentinel." The "Super-Sentinel" Tractor. Motor Transport (Lond.), vol. 37, no. 967, Sept. 10, 1923, pp. 333–334, 4 figs. Details of design of steam tractor designed for standardized production; direct drive.

TRAILERS

Trailmobile Universal Chassis. Trailmobile Universal Chassis, Caleb W. Shipley. Army Ordnance, vol. 3, no. 19, July-Aug. 1923, pp. 23–28, 7 figs. Cost of trailmobile universal chassis more than offset by economies it effects in replacement parts and flexibility of service alone; other economies; details of design.

TRANSPORTATION

Highway. Road Transport, A. E. Berriman. Engineering, vol. 116, no. 3012, Sept. 21, 1923, pp. 380–381. Deals with freight transport by road and by rail; types of commercial vehicles and their suitability for different purposes; passenger vehicles; road improvement and traffic control. Paper read before Brit. Assn.

Railway. The Future of Transportation by Rail, E. O'Brien. Engineering, vol. 116, no. 3012, Sept. 21, 1923, pp. 381–382, 1 fig. Survey of probabilities of future of rail transport with brief reference to past. Paper read before Brit. Assn.

Science, Indebtedness to. Transport and Its Indebtedness to Science, Henry Fowler. Engineering, vol. 116, no. 3012, Sept. 21, 1923, pp. 377–380, 1 fig. Discusses investigations which led to development and perfection of steam and internal-combustion engines; scientific work in aeronautics; advances in metallurgy. Address before Brit. Assn.

TUBES

Steel, Manufacture of. Newport Works of The British Mannesmann Tube Company, Limited. Iron & Coal Trades Rev., vol. 107, no. 2897, Sept. 7, 1923, pp. 327–328, 6 figs. partly on p. 329. Latest addition is new plant for manufacture of lap-welded steel tubes, capable of manufacturing tubes from 14 in. up to 72 in. in diam. in lengths up to 25 ft.

V

VALVES

Pressure-Reducing. An Original Type of Reducing Valve. Power Engr., vol. 18, no. 211, Oct. 1923, pp. 385–386, 2 figs. Describes principle and characteristics of Clark's reducing valve, made under Eyre's patent.

Pump. Ismailia Valves for Pumps and Mains. Engineering, vol. 116, no. 3013, Sept. 28, 1923, pp. 392–393, 13 figs. Valve in which ordinary hinge arrangement has been eliminated from design was introduced for use at Ismailia pumping station at Cairo; application is being extended to general field of service where liquids contain sand, grit, refuse and other solid matter.

VARNISHES

Tests. Report of Sub-Committee IX on Varnish. Am. Soc. for Testing Matls., advance paper, no. 48s, for meeting June 25–29, 1923, 17 pp., 6 figs. The "Kauri" reduction test as accelerated method of determining durability of varnish; exposure test, and results; proposed methods of testing oleo-resinous varnishes.

VENTILATION

Office Buildings. The Ventilation of Office Buildings, Charles L. Hubbard. Bldg. Age., vol. 45, no. 9, Sept. 1923, pp. 66–68, 6 figs. Suggestions for improving ventilating conditions in buildings already in process of preparation or in use.

VISCOSIMETERS

Combined Plastometer and. A New Combined Viscometer and Plastometer, E. C. Bingham and H. A. Murray, Jr. Am. Soc. Testing Matls., advance paper, no. 76, for meeting June 25–29, 1923, 9 pp., 2 figs. Proposes new principle in viscometry where shearing stress is varied by allowing material to enter capillary under constant pressure head; advantages of method.

W

WAGES

Minimum-Wage Law. Some Effects of the Operation of the California Minimum Wage Law, Louis Bloch. Monthly Labor Rev., vol. 17, no. 2, Aug. 1923, pp. 1–12. Summarizes results of operation of law, revealed by statistics gathered by California Industrial Welfare Commission.

Piecework System. Piece Work Wage Payment in the Soap Industry, N. Shapiro. Indus. Management (N. Y.), vol. 66, no. 4, Oct. 1923, pp. 228–229. System that promotes good work and good will.

WATER POWER

Optimum Power of Heads. Determining the Optimum Power of which Heads of Water are Capable (Sur la détermination de la puissance optimum d'aménagement des chutes d'eau), E. Baticle. Houille Blanche, vol. 22, no. 183, July-Aug. 1923, pp. 132–134, 4 figs. Variability of quantity of water available; curves of actual water supply; their use in determining optimum; examples and calculations.

Tennessee. A Study of Some of the Smaller Undeveloped Water Powers of Tennessee, J. A. Switzer. State of Tenn. Dept. Education, Division of Geol., Bul. 30, 1923, 24 pp., 37 figs. on supp. plates. Red River, Chestuee Creek, Cummins Falls, Harpeth River, Buffalo River, and Nolichucky River projects; "Narrows" of Caney Fork; Obed River, Piney River and Soddy Creek investigations.

WELDING

Electric. See ELECTRIC WELDING; ELECTRIC WELDING, ARC.

Oxy-Acetylene. See OXY-ACETYLENE WELDING.

Speed In. Speed Versus Good Welding, R. G. Mason. Am. Welding Soc.—Jl., vol. 2, no. 8, Aug. 1923, pp. 10–12, 1 fig. Troubles resulting from speedy welding.

WIRE ROPE

Stresses. Stresses in Wire Rope (Beitrag zur Kenntnis der Vorspannungen in Drahtseilen), A. Werner Glückauf, vol. 59, nos. 31 and 32, Aug. 4 and 11, 1923, pp. 741–745 and 772–777, 7 figs. Aug. 4: Theory of wire rope and present method of manufacture, especially recommending changes in form and tension; deformation of wire in lacing machine Aug. 11: Deformation in strands on making into rope, explained by mathematical calculations.

Z

ZINC ALLOYS

Machine-Tool Bearings, for. Copper-Poor Zinc Alloys for Machine-Tool Bearings, the Influence of Casting and Lubrication (Kupferarme Zinklegierungen für die Lagerungen der Werkzeugmaschinen, Einfluss des Gieszens und der Schmierung), G. Schlesinger and M. Kurrein. Werkstattstechnik, vol. 17, nos. 16 and 17, Aug. 15 and Sept. 1, 1923, pp. 481–487 and 522–526, 24 figs. Account and results of tests for purpose of substituting for bronze bearings, bearings of zinc alloys with little or no copper content. Report of experimental department for machine tools of Charlottenburg Technical Academy.

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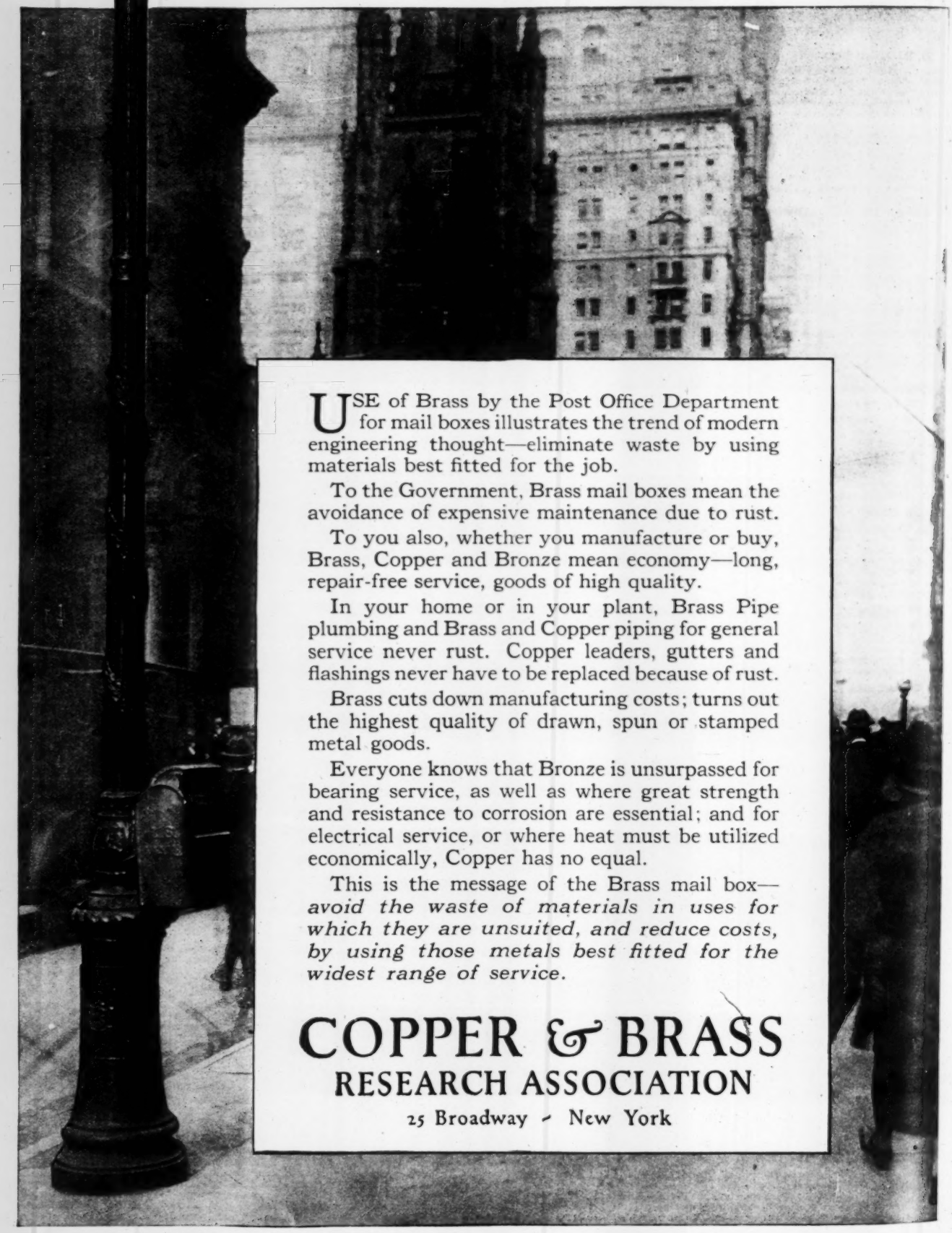

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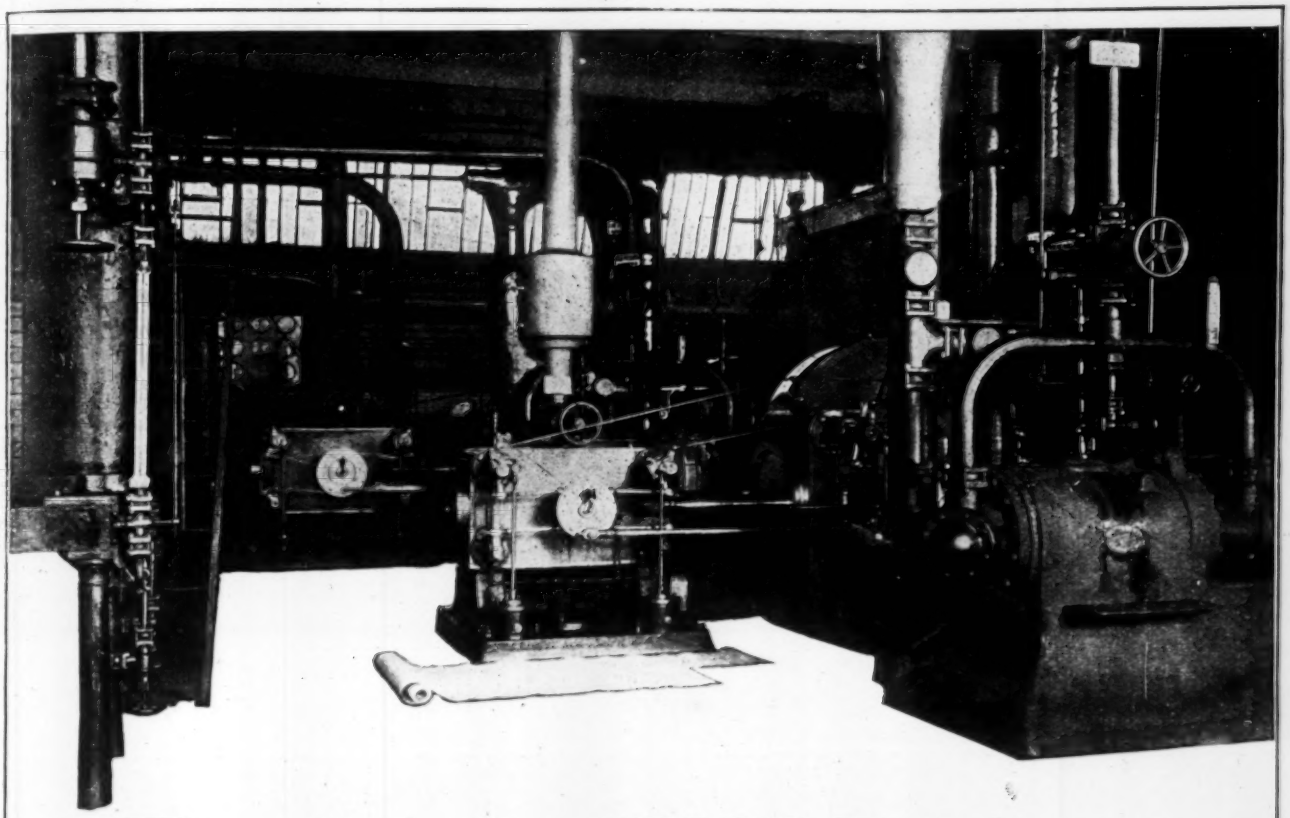

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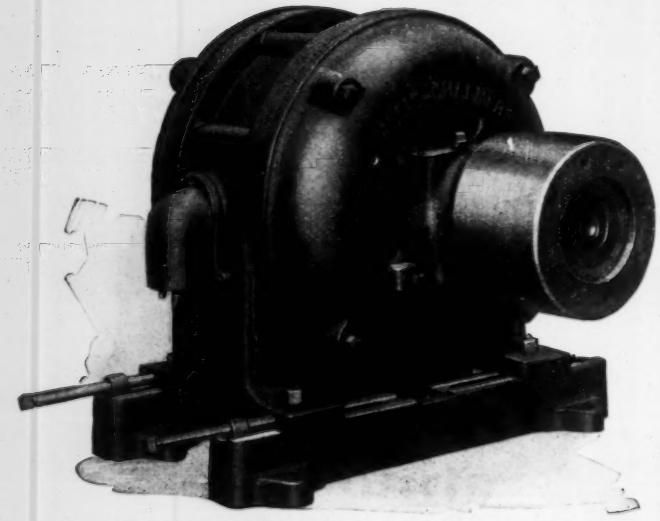

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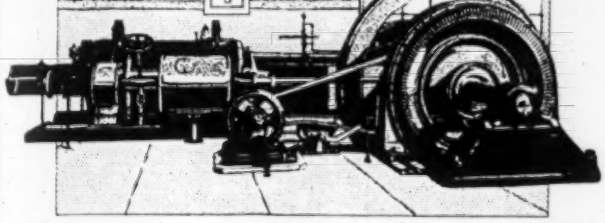

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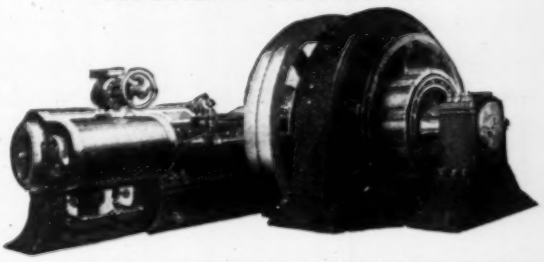

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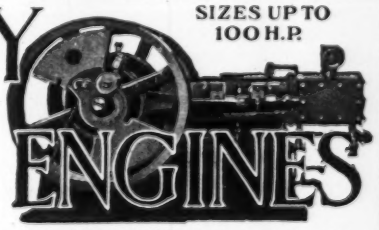

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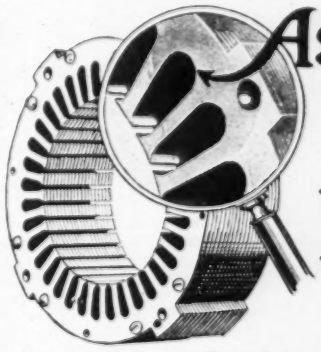

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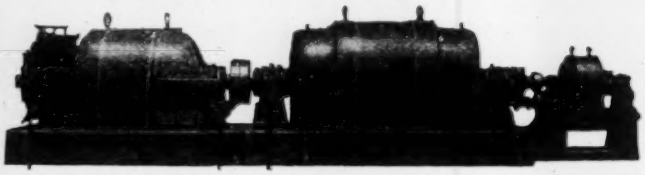

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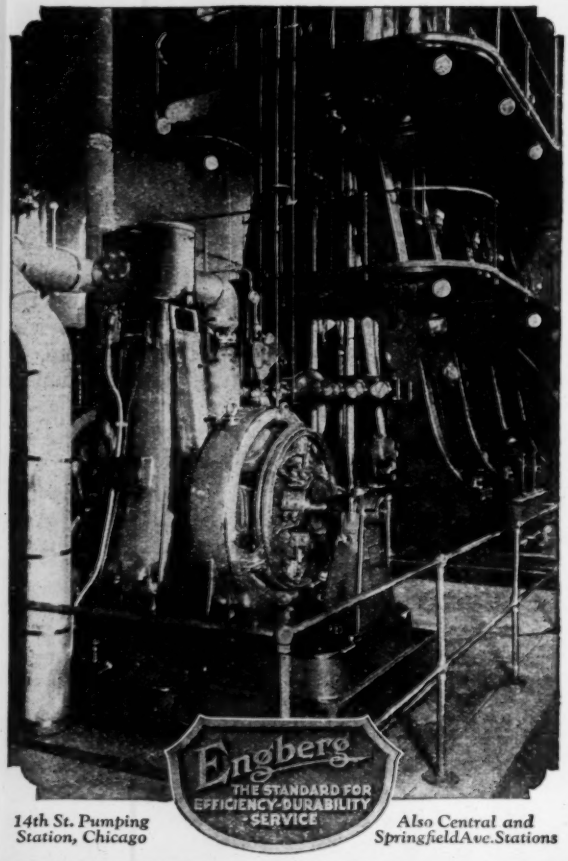

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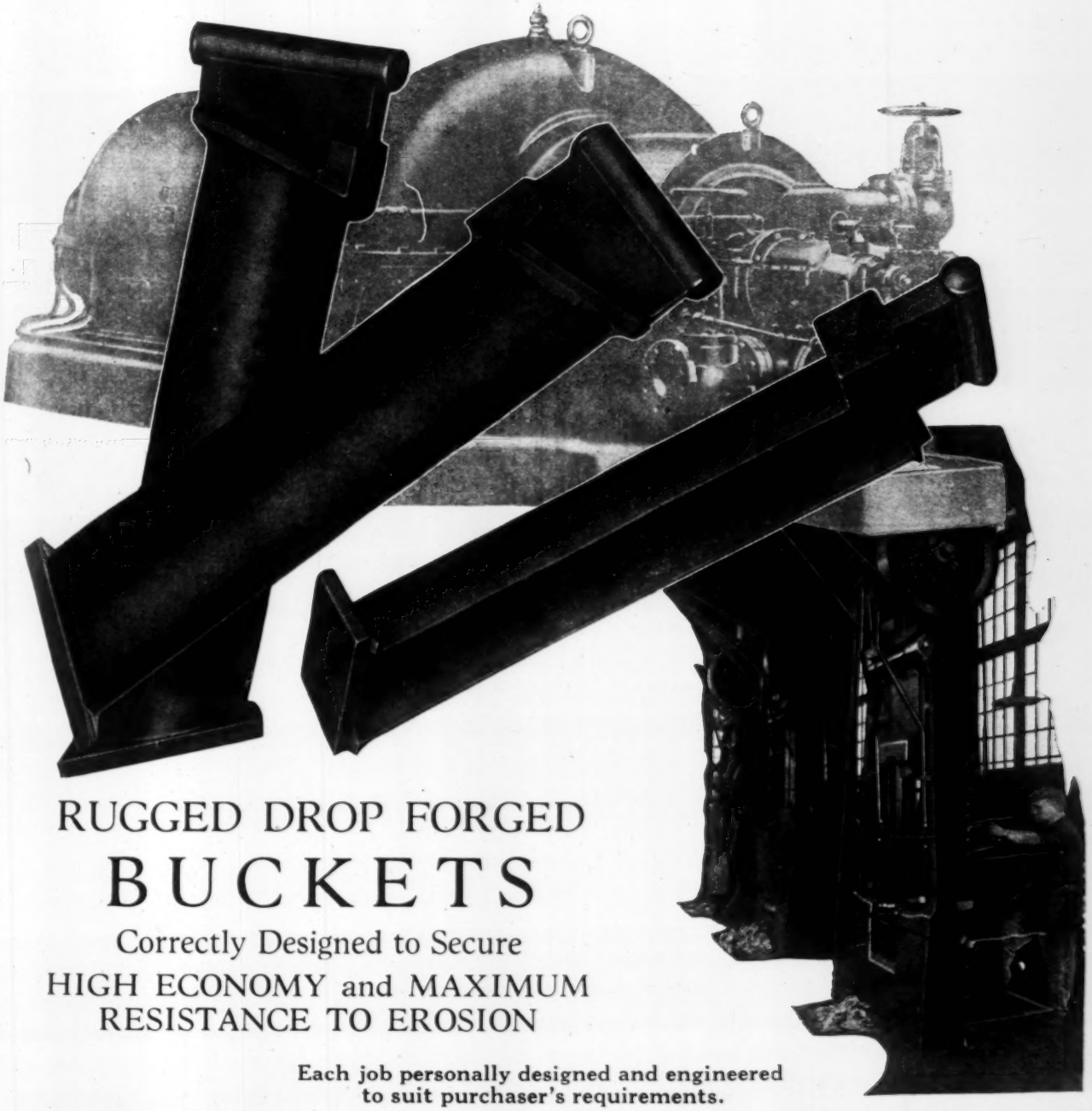

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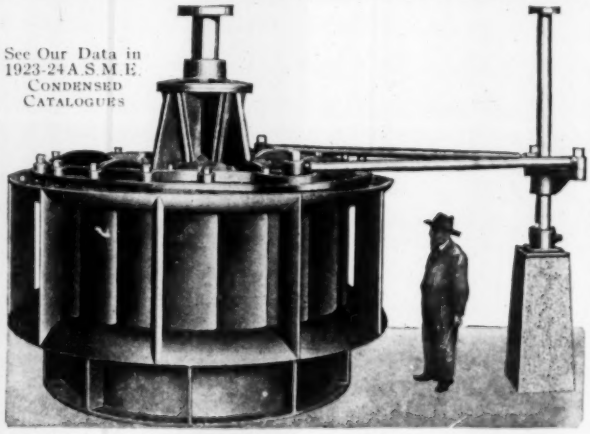

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in ALL BRANCHES of the ENGINEERING FIELD

The cards of Consulting Engineers appearing on pages 136, 137, 138, 139, and 140 of this issue serve as an index to professional service in the mechanical field. Specialized service may be obtained through this section on such subjects as

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Construction
Copyrights
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Industrial Plants
Inspection
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Machinery Designing
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Manufacturing Methods
Marines
Material Handling
Oil Refineries
Organization
Paper & Pulp Mills
Patent Law
Petroleum
Plant Construction
Power Plants
Power Transmission
Production
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Purchasing
Refrigeration
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Silk Mills
Special Machinery
Statistics
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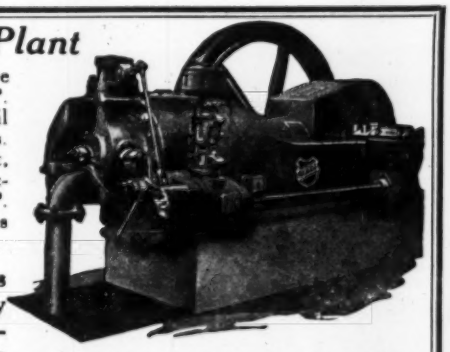
destroyed by fire used a 50 H.P. Otto-Diesel Oil Engine for 9 years. Now being rebuilt, tripling its capacity and 150 H.P. Otto Oil Engines being installed.



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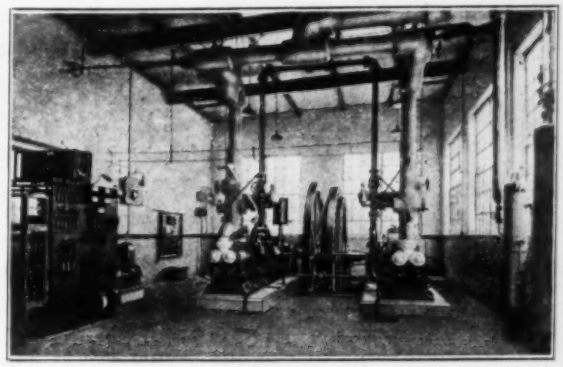

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BIG PROFITS

Ice Plant Owners know this, both by their own observation and by reports of friends.

To do this, Frick Equipment must have certain essential qualifications—It has

Design of Most Efficient Type
Strength and Endurance
Materials and Workmanship of the Best
Perfection of Details

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FRICK COMPANY
WAYNESBORO, PA.

See our Data on Page 464 in 1923-24 A.S.M.E. CONDENSED CATALOGUES OF MECHANICAL EQUIPMENT

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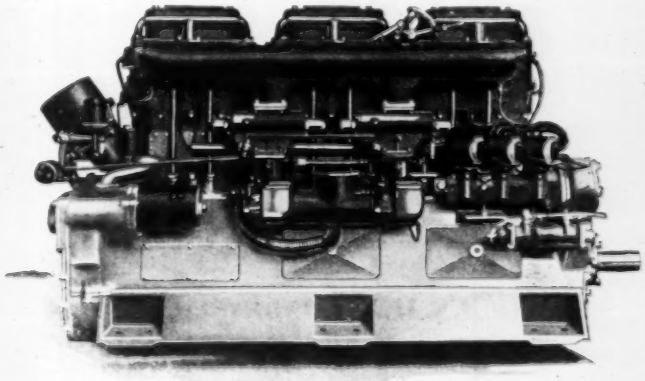

An efficient standby High Duty Internal Combustion engine for direct connection. Can parallel

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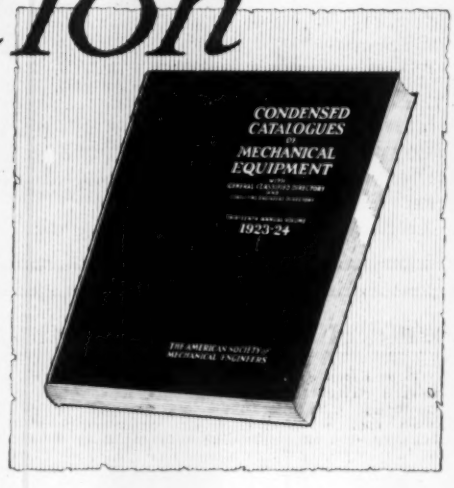

All in convenient, accessible form—an encyclopedia of mechanical equipment and a directory of manufacturers in the mechanical field.

The annual volume of A.S.M.E. Condensed Catalogues of Mechanical Equipment is now recognized as the standard reference book for the mechanical engineering profession. Its information is readily available because all catalogue pages are arranged in classified order according to equipment and all products thoroughly indexed and cross-indexed, so that the data sought may be conveniently found. Due to the use of super bible paper and flexible binding the book is as easily handled as a standard trade paper and can be conveniently carried in a portfolio when necessary.

1923-24 A.S.M.E. CONDENSED CATALOGUES CONTAINS NEARLY 700 PAGES OF VALUABLE WORKING DATA

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484 Pages

Covering the products of 393 leading American manufacturers, all conveniently arranged in standardized form, liberally illustrated and giving, so far as circumstances permit, complete tables of dimensions, capacities, weights, etc. All catalogue pages are so grouped as to afford ready comparison between the equipment of different manufacturers in the same line.

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1. Power Plant Equipment.
2. Testing, Measuring and Recording Apparatus.
3. Power Transmission Machinery.
4. Conveying, Hoisting and Transporting Machinery.
5. Metals, Alloys and Other Materials.
6. Metal Working Machinery, Machine Tools and Shop Equipment.
7. Compressors, Fans, Pumps, Heating Equipment, Hydraulic, Refrigerating and Industrial Machinery.

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175 Pages

in which all American first-hand manufacturers of equipment coming within the scope of the volume are listed *without charge* under as many subject headings as required to cover adequately their line of products.

More than 4,400 firms are classified under 3,600 different subject headings, making a total of more than 30,000 separate listings—all carefully arranged and accurately cross-indexed to insure maximum convenience and usefulness.

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CONSULTING ENGINEERS DIRECTORY
18 Pages

A distinctive feature of the volume is the Directory of Consulting Engineers in which approximately one thousand engineers and engineering organizations are listed according to their special lines of practice. We know of no other medium through which Industrial Executives or Plant Engineers can so readily locate those consulting engineers who are best qualified to give professional assistance along any required line.

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Every A.S.M.E. member (prior to October 1st, 1923) should have received a copy of the 1923-24 volume free of charge. New Members may secure copies at $4.00 per copy postpaid, by addressing

The American Society of Mechanical Engineers 29 W. 39th Street, New York

WORTHINGTON

This Compressor Saves $775 a Year

The air compressor shown is a Unaflow steam cylinder machine having a capacity of 1,500 cubic feet of air per minute. This compressor under usual conditions will save 4,980 pounds of coal in an eight-hour day, as compared with a Meyer Gear Compressor—a saving which amounts to $775.00 in a year.

With the possibility of your saving operating costs at that rate you will enjoy reading Bulletin L 542-A.

THE UNAFLOW ENGINE

Another contributing reason for the exceptionally high economy of the Unaflow compressor is high compression. As the steam, expanding away from the cylinder head, rushes out through the central exhaust port, it carries practically all the wet steam out through the exhaust. When the exhaust port is closed, by the returning piston, the remaining steam, which is comparatively free from moisture, due to the effect of the steam jackets, is compressed to practically initial pressure.

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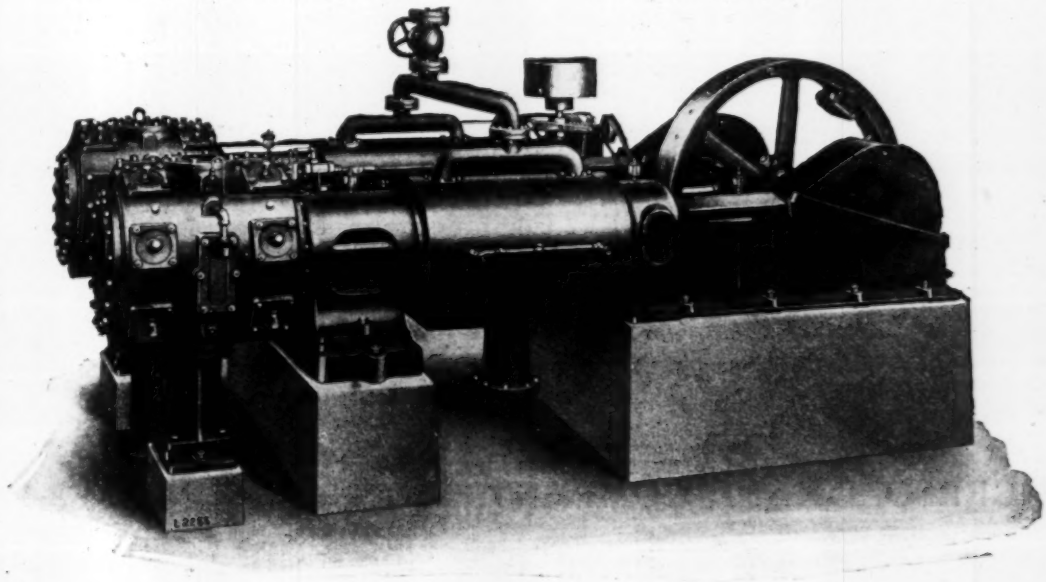
As a result, cylinder condensation is practically eliminated, and a performance is obtained that is most exceptional. Worthington Unaflow Compressors lead the market by their remarkable economy and smooth operating qualities.



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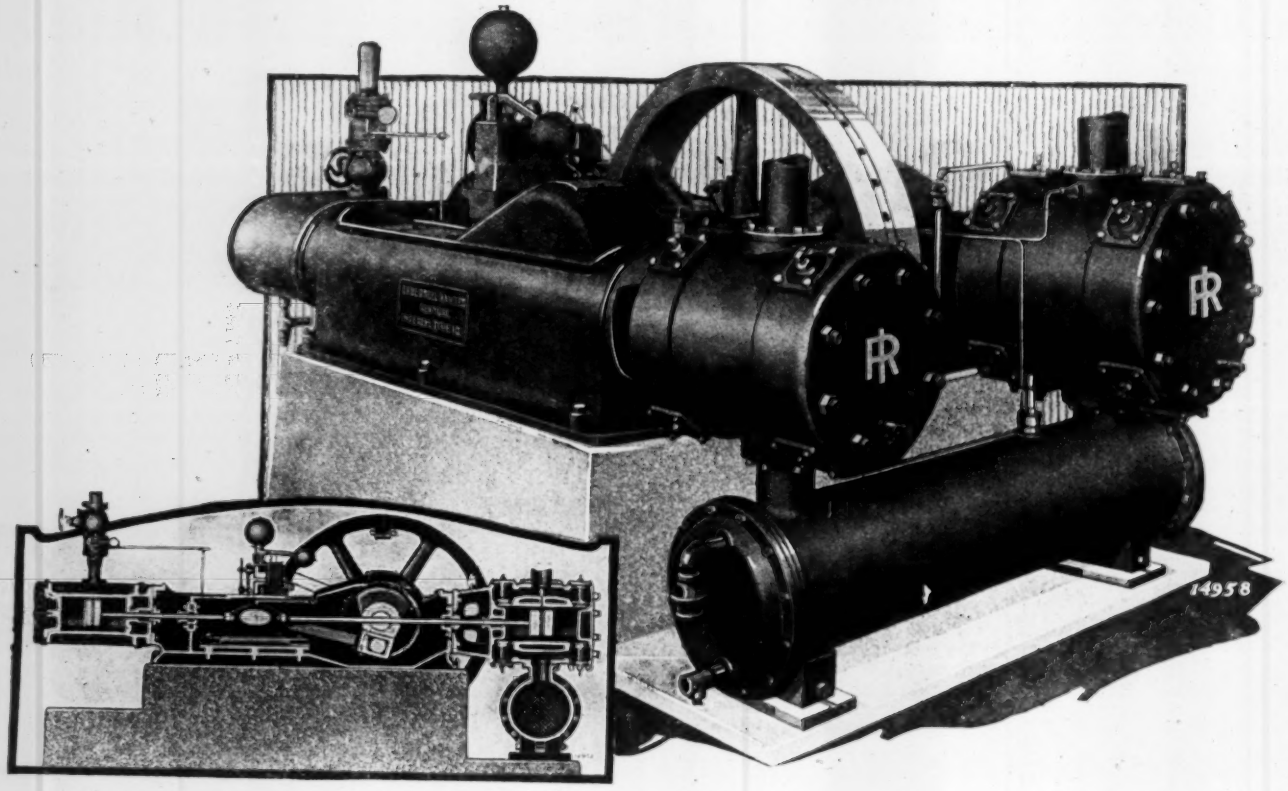
Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*
Epping-Carpenter, *Pittsburgh, Pa.*



Accessibility

Ingersoll-Rand Type "XPV" Steam Driven Compressors Are Compact and Accessible.

Distinctive Features

Automatic cut-off governor
Piston steam valves
I-R Plate air valves
Enclosed construction
Automatic lubrication

Send for a copy of Bulletin 3044—It's new.

The unique construction, in which air and steam cylinders are located at opposite ends of the main frame, reduces the number of pressure stuffing boxes and eliminates long piston rods. It also permits of quick removal of air and steam pistons and cylinder heads.

Type "XPV" Compressors are easy to erect because of their unit construction which assures correct alignment and requires less floor space.

The accessibility to valves, cylinders, steam valve gear and automatic cut-off governor is characteristic of "XPV" Steam Driven Compressors.

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

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744-C

Ingersoll-Rand

SINCLAIR OILS

Five 588 H. P. Edge Moor Boilers during erection at the Marcus Hook plant of the Sinclair Refining Company.

THE Sinclair Refining Company, one of the country's greatest producers and refiners of petroleum products, is another of the many industrial leaders that are reducing power costs and increasing boiler room efficiency with Edge Moor Boilers.

Four of the big Sinclair plants are equipped with 18 Edge Moor Boilers totaling more than 10,500 B. H. P. Three years after purchasing the boilers for their plants at Coffeyville and Kansas City, Kansas, repeat orders were placed for five Edge Moor boilers for the Marcus Hook, Pa., plant and four for the Houston, Texas, plant.

Edge Moor Water Tube Boilers are designed and built to meet the requirements of modern power plants. Construction details and performance records are shown in the Edge Moor catalogue. Tell us where to send your copy.

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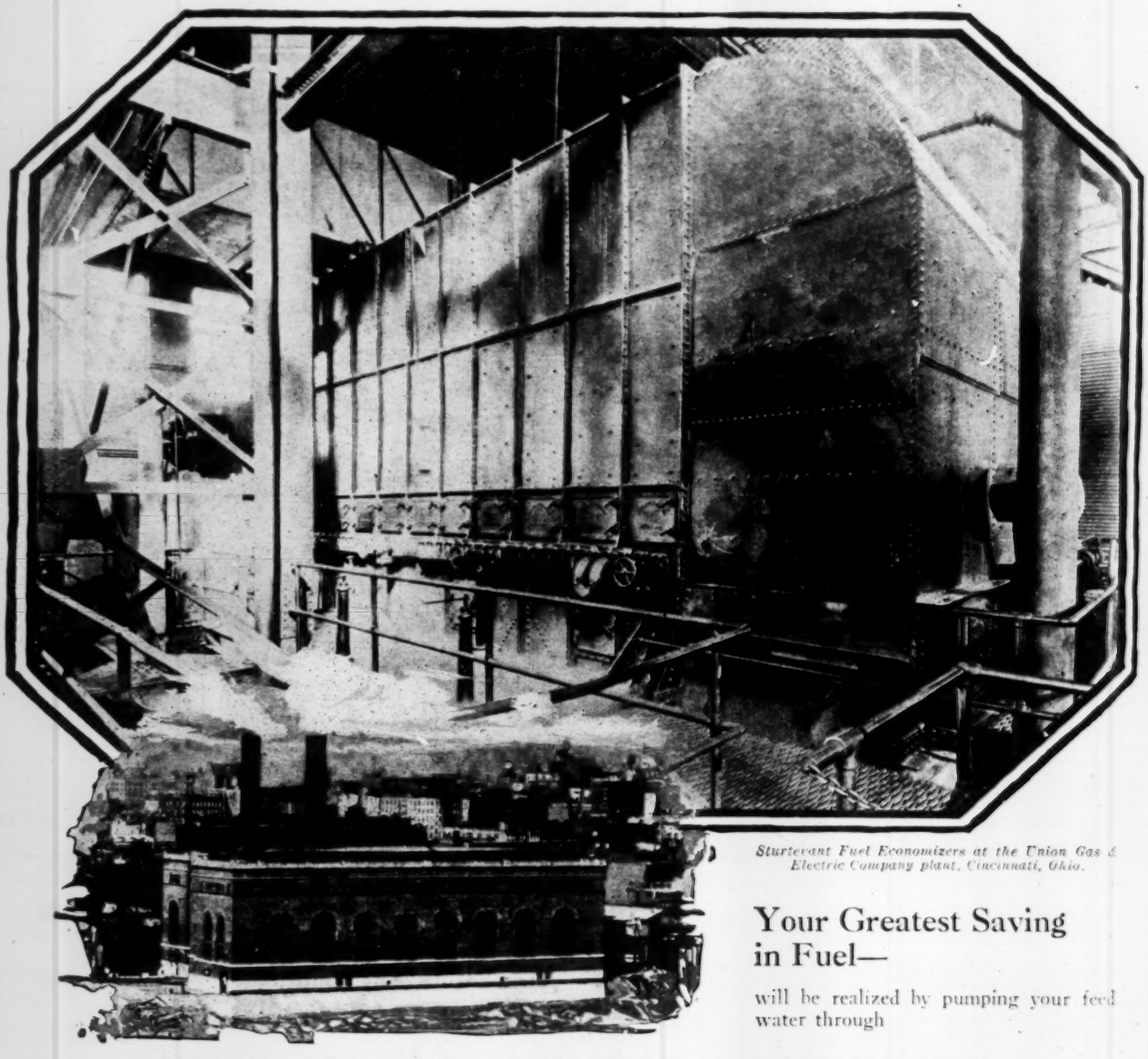
FOR INCREASED FUEL ECONOMY



Sturtevant Fuel Economizers at the Union Gas & Electric Company plant, Cincinnati, Ohio.

Your Greatest Saving in Fuel—

will be realized by pumping your feed water through

STURTEVANT FUEL ECONOMIZERS

The water is heated to within a few degrees of steam temperature by using the waste heat of the flue gases which surround the tubes. Heat which is ordinarly wasted up the chimney is reclaimed and returned to the boilers.

It is commonly understood that for every 11% rise in feed water temperature there is a saving of 1% in the fuel bill. Sturtevant Economizers raise the temperature from 100 to 150 degrees.

Fixed charges are low, due to the construction. Sturtevant patented tapered metal-to-metal joints eliminate leakage loss and make it easy to replace any tube. Gaskets or cement are not used.

Your installation presents its own peculiar problem. Our engineering department is available for consultation without obligation. Why not learn what Sturtevant Fuel Economizers can save in your plant.

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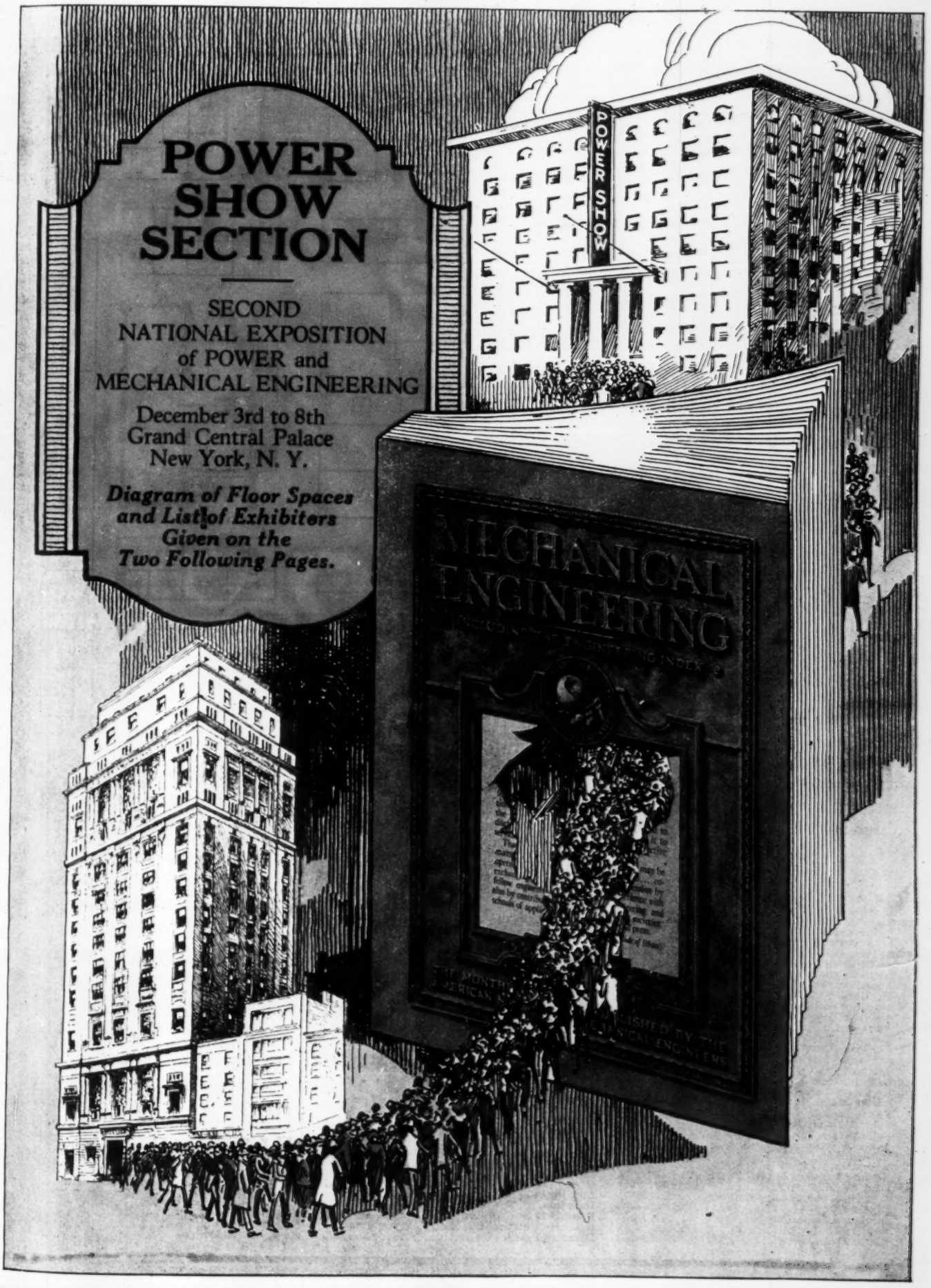
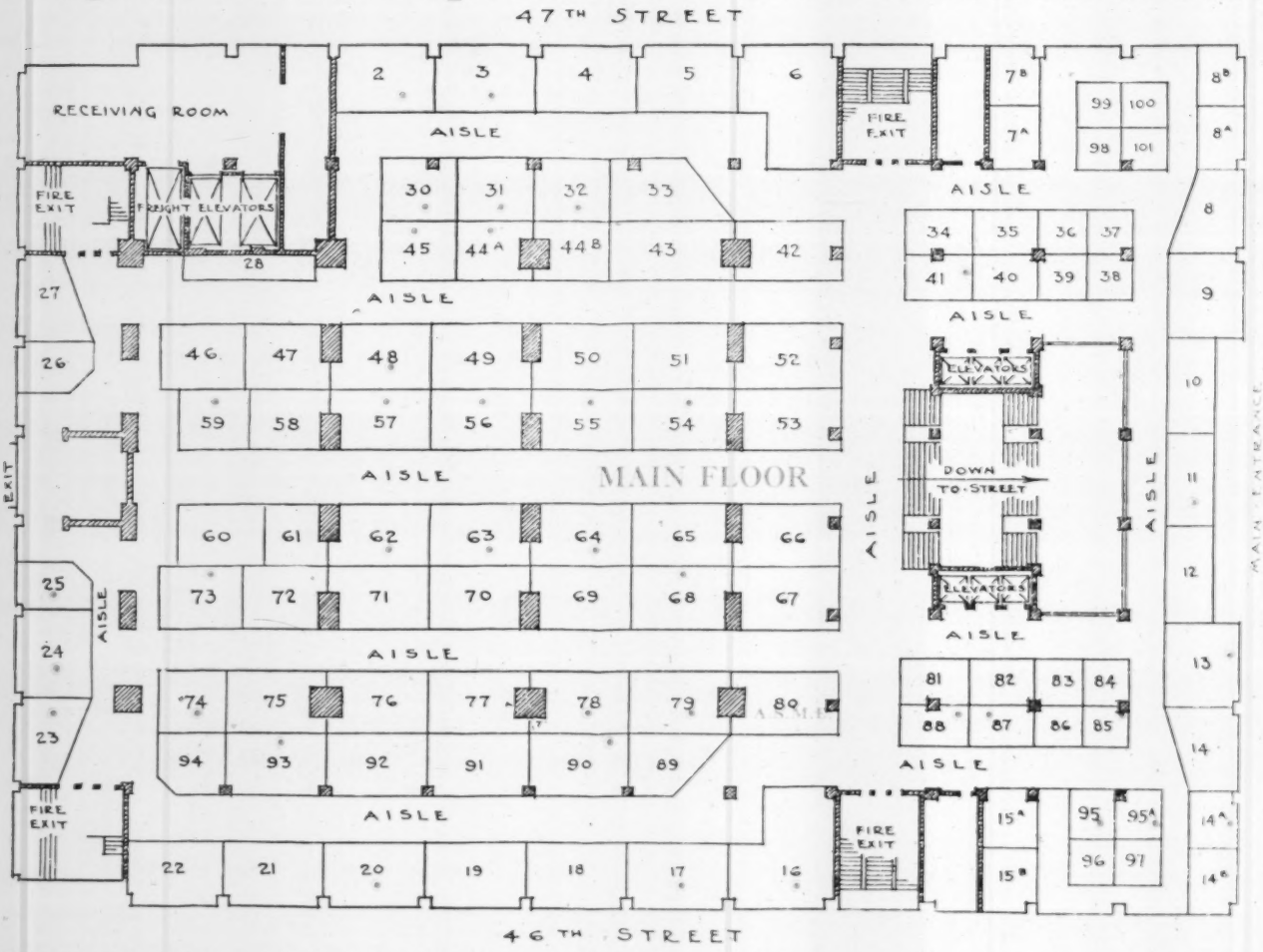

POWER SHOW SECTION
SECOND NATIONAL EXPOSITION of POWER and MECHANICAL ENGINEERING
December 3rd to 8th
Grand Central Palace
New York, N. Y.
Diagram of Floor Spaces and List of Exhibitors Given on the Two Following Pages.
POWER SHOW
MECHANICAL ENGINEERING

Diagram of Floor Spaces and List of Exhibitors at Second



INFORMATION regarding the exhibits or products of firms listed in bold face type below is given in the following color pages. Each advertiser's booth may be located readily by referring to the numbered diagram of floor spaces shown above, where it is marked by a red dot.

List of Exhibitors

(Corrected to November 19)

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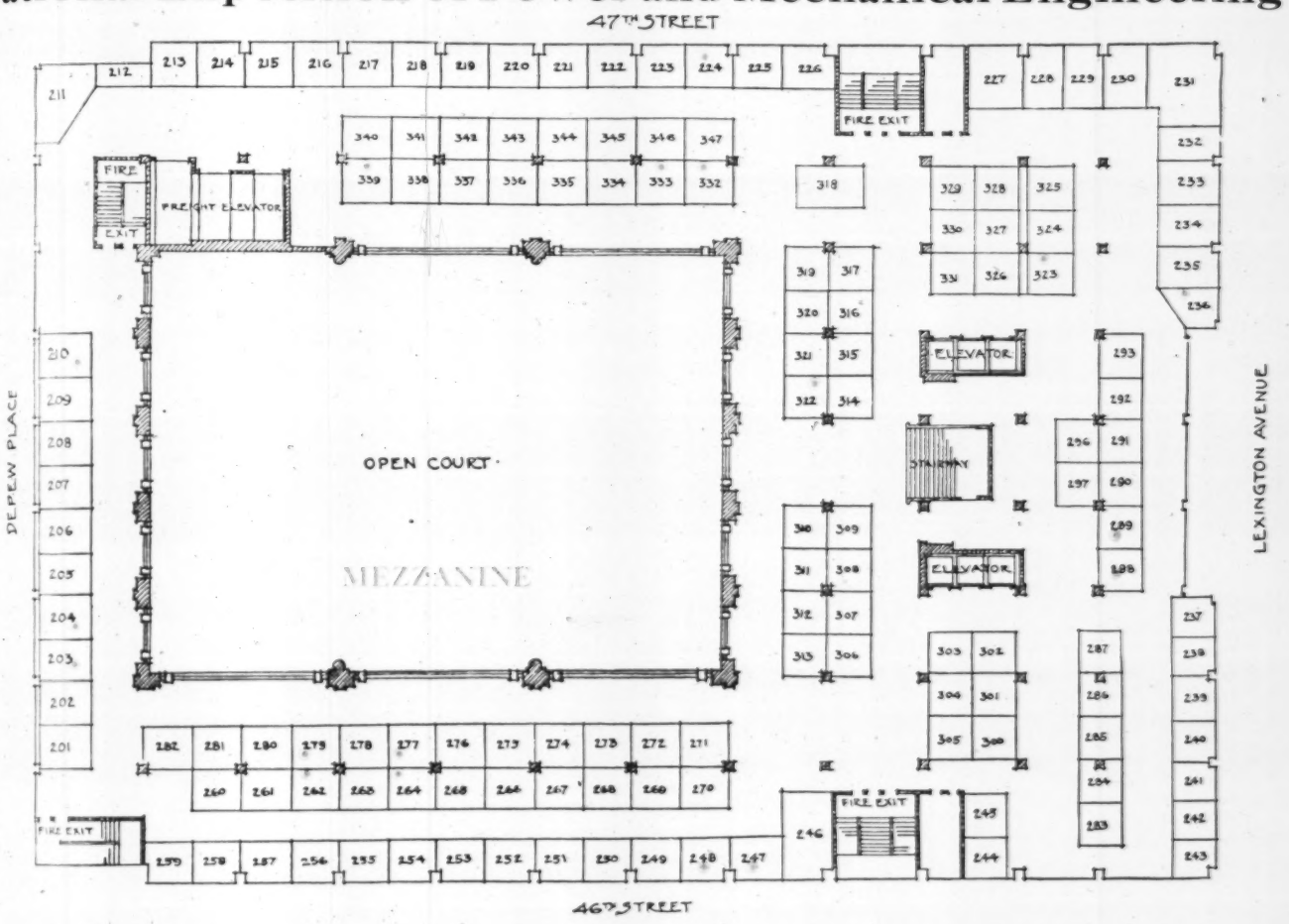
National Exposition of Power and Mechanical Engineering



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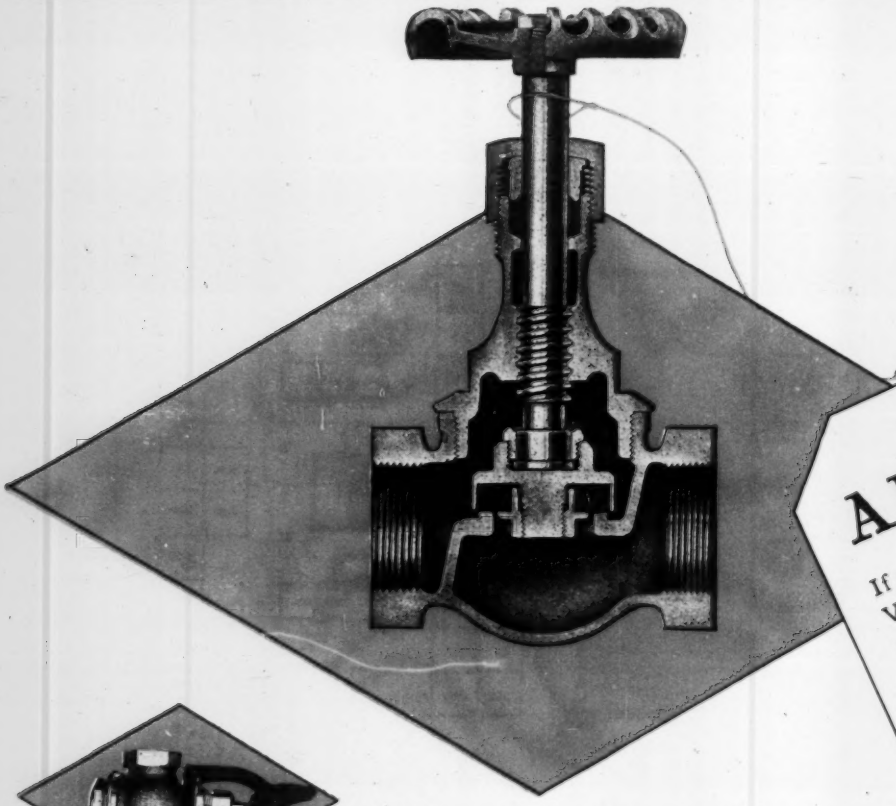
Yarnall-Waring Co	7A & 7B

Power Show BOOTH No. 90 Grand Central Palace - New York, N.Y. December 3rd to 8th



A Fair Offer

If you will put a Jenkins Valve on the worst place you can find, where you cannot keep other valves tight, and if it is not perfectly tight, or does not hold steam, oil, acids, water, or other fluids, longer than any other valve, *you may return it and your money will be refunded.*

Fig. 720, Bronze Rapid Action Valve

The Jenkins Diamond
your guide to economical valve service

The man who actually knows valves and valve requirements, judges valve economy by valve service.

To him the most economical valve is the valve that operates satisfactorily and does its job well for the longest time.

And for that reason, he specifies Jenkins Valves wherever a valve is required. Long usefulness, years and years of service, prove the wisdom of his choice.

He specifies Jenkins "Diamond Marked" Valves, for he knows that Jenkins service can be expected only from genuine Jenkins Valves.

* * * *

Visit us at Space 90 Power Show

Fig. 325, Screwed, Standard Iron Body Gate Valve

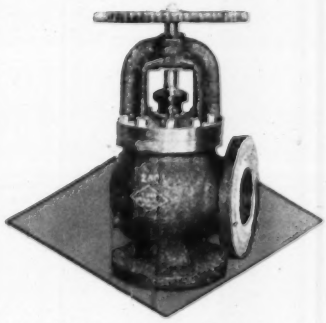


Fig. 293, Flanged, Extra Heavy Iron Body Automatic Equalizing Stop and Check Valve

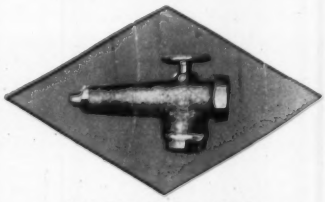


Fig. 709, Bronze Air Gun

JENKINS BROS.

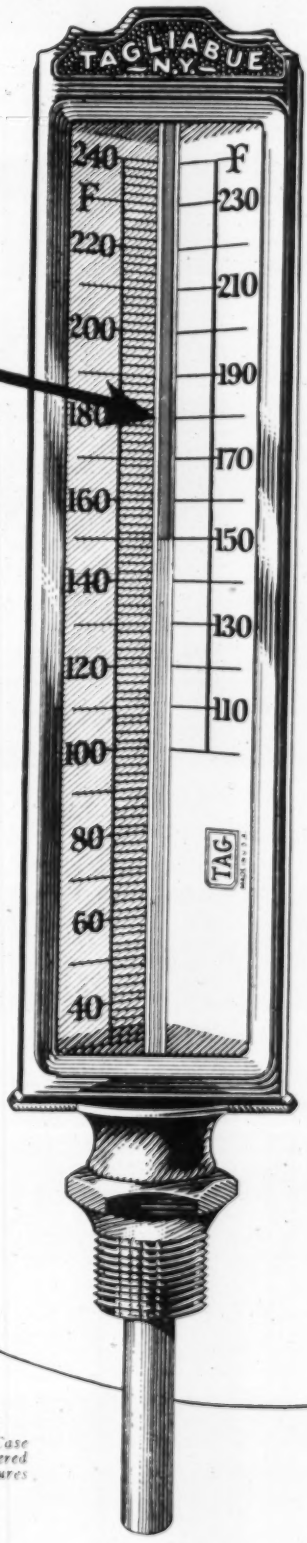
80 White Street ..... New York, N. Y.
524 Atlantic Avenue ..... Boston, Mass.
133 No. Seventh Street ..... Philadelphia, Pa.
646 Washington Boulevard ..... Chicago, Ill.

Jenkins Valves

SINCE 1864

Power Show BOOTH No. 59 Grand Central Palace - New York, N.Y. December 3rd to 8th

The
TAG-HESPE
RED
READING COLUMN
for
MERCURY THERMOMETERS



Specifications—Bronze Case with Glass Front; Silvered Scale with Black Figures and Graduations.

EASY TO READ—The TAG-Hespe Column, an EXCLUSIVE TAG Feature, shows as a broad red line from the top of the mercury column to the top of the tube. When the mercury rises it covers more of this red line; when the mercury falls a correspondingly greater length of the red line is exposed. The decided contrast between this bright red line and the metallic grey of the mercury brings to the accurate mercury thermometer the easy readability of the red spirit instrument.

TAG-Hespe thermometer glass (tubing) is in every way similar to ordinary lens front thermometer glass except that in TAG-Hespe glass the BACK of the fine capillary bore (up and down which the mercury travels) is made of bright red GLASS. This red streak of glass extends all the way from the top of the thermometer down to the bulb. Note particularly that the red glass is in the back of the bore and NOT at the back of the tube.

The red line attracts the eye at first glance and it is easy to follow it down and take the reading at its bottom which is, of course, the top of the mercury column. The broad line of red stands out like a semaphore set at danger. You CAN'T miss it.

HONEST AND STURDY RECORDING AND DIAL-INDICATING THERMOMETERS give you accurate and reliable information of your various apparatus and processes.

SAFETY IN OIL BURNING—The TAG Shut-off Valve is connected in the fuel lines of oil burner equipped boilers and other devices and automatically shuts off the oil flow, the instant that the steam or oil pressure used for atomizing, falls below the required minimum. The TAG Valve LOCKS ITSELF and cannot be reopened (even though the atomizing pressure is brought up to the required point) until the trip lock mechanism is reset by hand. Absolutely prevents oil leakage into furnace and the possibility of a disastrous explosion.

CO_2 AND CO RECORDS on the same chart enable you to operate just at the critical point, on one side of which is the unnecessary air excess loss and on the other side, the combustible gas loss due to not enough air. The highest possible CO_2 without CO can be secured at all times through the dependable guidance of the TAG-Mono Duplex. The continuous record of BOTH CO_2 and CO tells you at a glance whether your stoker and draft adjustments are right and also aids you in discovering faulty furnace conditions.

C. J. TAGLIABUE MFG. CO. N.Y.

Since 1769

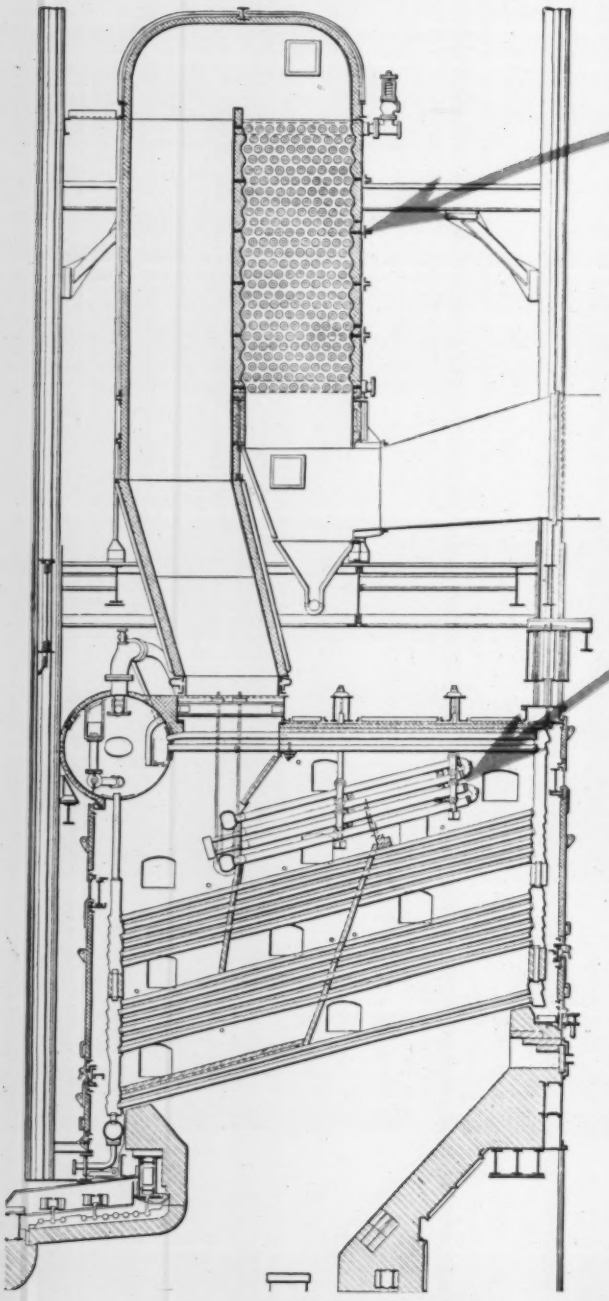
SEND FOR CATALOG M-640

C. J. TAGLIABUE MFG. CO. 18 to 88 Thirty-Third St., BROOKLYN, N. Y.

AUTOMATIC CONTROLLERS FOR TEMPERATURE, PRESSURE, HUMIDITY, TIME, LEVEL, AND CONDENSATION; INDICATING AND RECORDING THERMOMETERS; HYDROMETERS; OIL TESTING INSTRUMENTS; TAG-MONO GAS ANALYSIS RECORDERS, ETC.

BOSTON PITTSBURGH CHICAGO TULSA SAN FRANCISCO TORONTO

Power Show BOOTH No. 20 Grand Central Palace—New York, N.Y. December 3rd to 8th

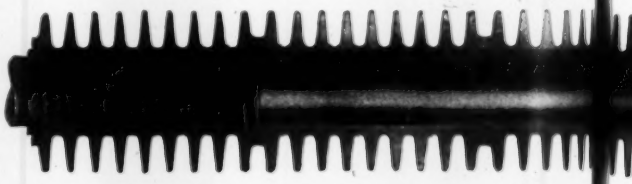


For better

preheat your boiler feed

It is an established fact that the fuel consumption under a boiler is reduced by approximately one per cent for each ten degrees added to the feed water if the heat to do this work is reclaimed from the waste gases. A Foster Economizer that adds 100 degrees to the boiler feed effects a 10% fuel saving.

The Foster Economizer can be installed in the boiler flue with unimportant alterations and because of the patented Foster construction occupies only about one-half the space required by other preheating surfaces.



The FOSTER Patented

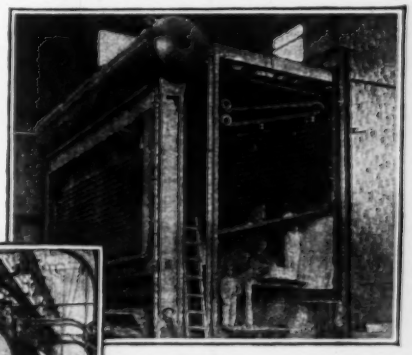
The records of more than 10,000 installations in stationary power plants, extending over 20 years of service and in all conceivable operating conditions, have firmly established the practical advantages of the special Foster construction for superheaters and economizers.

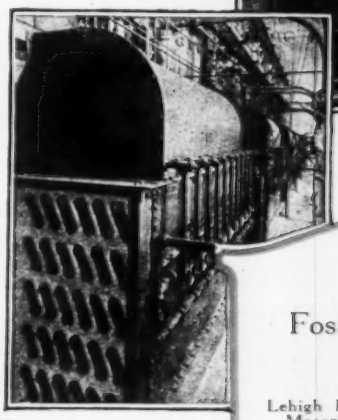
In the Foster construction, the seamless inner steel tube and the outer ribbed cast iron rings into which the tube is tightly fitted, form a combination that ideally meets the two superheater requirements of strength and resistance to corrosion.

FOSTER ECONOMIZERS

plant economy

superheat your steam





Superheating has long been known to be one of the most economical means of improving power plant economy. In the boiler, superheating abstracts additional heat from the furnace gases; in the pipe lines, it reduces condensation losses; and in engines and turbines it enables a given weight of steam to do more work. The low initial cost, negligible upkeep, thorough reliability and marked improvement in boiler and engine economy of the thousands of Foster installations have caused the Foster Superheater to be generally regarded as standard equipment for the up-to-date and efficient plant.

Some 1923 Foster Installations

	B. hp.
Lehigh Portland Cement Co., Mason City, Ia.	5000
American Woolen Co., Lawrence, Mass.	4020
Texas Company, Port Arthur, Tex.	5952
Sinclair Refining Co., Houston, Tex.	2352
American Hardware Corp., New Britain, Conn.	2024
Texas Sugar Refining Co., Galveston, Tex.	3095
Bigelow Hartford Carpet Corp., Tompsonville, Conn.	2760
Northern States Power Co., St. Paul, Minn.	15000
Moline Rock Island Mfg. Co., Moline, Ill.	4178
Public Service Corp. of Colorado, Boulder, Col.	5600
Milwaukee Elec. Ry. & Lt. Co., Milwaukee, Wis.	14120
Metropolitan Edison Co., Reading, Pa.	7470
Appalachian Power Co., Glen Lyn, Va.	4928
United Elec. Lt. & Power Co., New York, N. Y.	4650
Cleveland Electric Ill. Co., Cleveland, O.	12000

The Foster Radiant Heat-Absorbing Superheater

has great advantages for high superheat conditions when used either alone or in combination with the Foster extended surface connection type superheater. Write for full information.

Extended Surface

Furthermore, the heavy ribbed cast iron rings, by presenting to the furnace gases from four to six times as much superheating surface as the bare tube construction, increase the superheating effectiveness, and steady the superheat during periods of fluctuating steam demand.

It will pay you to investigate further the advantages of Foster Superheaters and Economizers. Write for bulletins and tell us your operating conditions so we can give you definite figures—without obligation—of the savings possibilities in your plant.

POWER SPECIALTY CO.

111 Broadway, New York

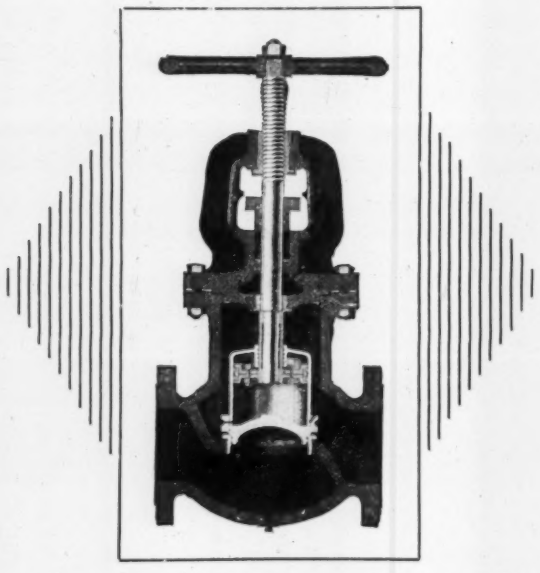
Boston Chicago Philadelphia San Francisco Pittsburgh
Kansas City Dallas London, Eng.

FOSTER SUPERHEATERS

Power Show BOOTH NO. 32 Grand Central Palace - New York, N.Y. December 3rd to 8th

EDWARD Valves

Have been pioneers in serving the needs of the country's foremost engineers in their steady march toward higher efficiency of power plants. In this day of ever higher temperatures and pressures EDWARD Valves are not only keeping pace with the demand—they are anticipating it.



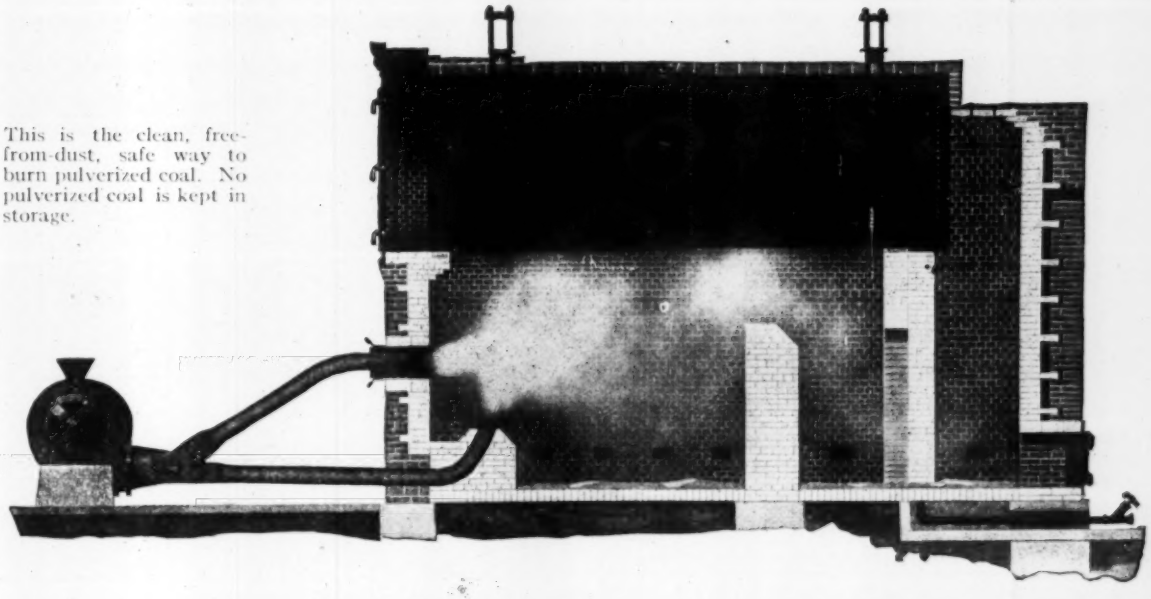
The Edward Valve & Manufacturing Co.

Main Office and Works: East Chicago, Indiana.

AGENTS IN ALL PRINCIPAL CITIES

Power Show BOOTH Nos. 288 & 289 Grand Central Palace - New York, N.Y. December 3rd to 8th

This is the clean, free-from-dust, safe way to burn pulverized coal. No pulverized coal is kept in storage.



Coal Consumption Cut 30%— Labor Requirements One-Third

And, on top of that, production increased from 20 to 25 per cent!

That's the record Erie City Pulverizers "put over" in a certain plant.

The first installation consisted of two Erie City Pulverizers, 3,000 lbs. capacity each.

Recently we received a repeat order for eight more pulverizers of the same capacity.

Tests that have been made demonstrate conclusively that you can get more steam per pound of coal from pulverized coal than from any other method of burning coal. A repeat order like this proves that Erie City Pulverizers are giving entire satisfaction to pulverized coal users.

PULVERIZED Coal Equipment

Ask for copies of these "Test Reports."

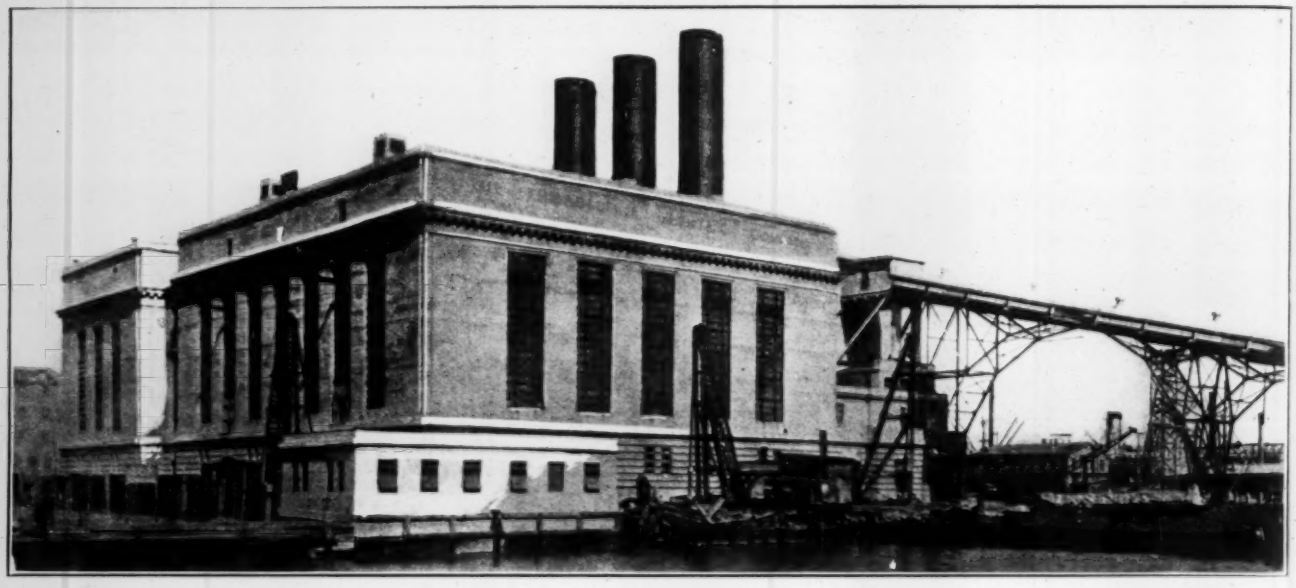
Erie City Iron Works

Erie, Pa., U. S. A.

Manufacturers, also, of Erie City Vertical Water Tube Boilers, Erie City Horizontal Water Tube Boilers, "Economic" Boilers and Lentz Poppet Valve Engines, as illustrated and described on pages 56 and 57 of the 1923-24 A.S.M.E. Condensed Catalogues.

Look us up at the Power Show—Booth Nos. 288 & 289

Power Show BOOTH No. 45 Grand Central Palace—New York, N.Y. December 3rd to 8th



Auxiliary CO_2 Indicator for mounting at the boiler front.

6 More for Delaware

Just installed—six more UEHLING CO_2 RECORDERS at the Delaware Station of the Philadelphia Electric Company—making a total of FOURTEEN that are in regular service guiding combustion economy at this modern central station.

In addition to the above, nine more UEHLING CO_2 RECORDERS have been at work for several years in the other plants of this company.

The simplicity of the UEHLING appeals to the practical man. The indicators on the boiler fronts are as easy to read as a big thermometer and give the firemen continuous visual evidence of the condition of the fires. The continuous accurate records of CO_2 drawn in the chief engineer's office are an invaluable aid in supervision and are proof of the combustion efficiency maintained by the men at all times.

"Pyro-porus" filtration protects the sampling line and instrument against fouling and corrosion. No liquid chemicals are employed. Absorption is accomplished by a dry carton that lasts a long time and which can be renewed in a few minutes at trifling cost.

Our engineers will be glad to show you how UEHLING INSTRUMENTS will save fuel for you. Write for Bulletins 220 and 221, which contain instructive tables and charts.

SEE THE NEW UEHLING CARBON MONOXIDE (CO) RECORDER AT OUR BOOTH NO. 45 AT THE POWER SHOW. This instrument completes the story of combustion and is used in conjunction with UEHLING or other CO_2 RECORDERS.

UEHLING INSTRUMENT CO.

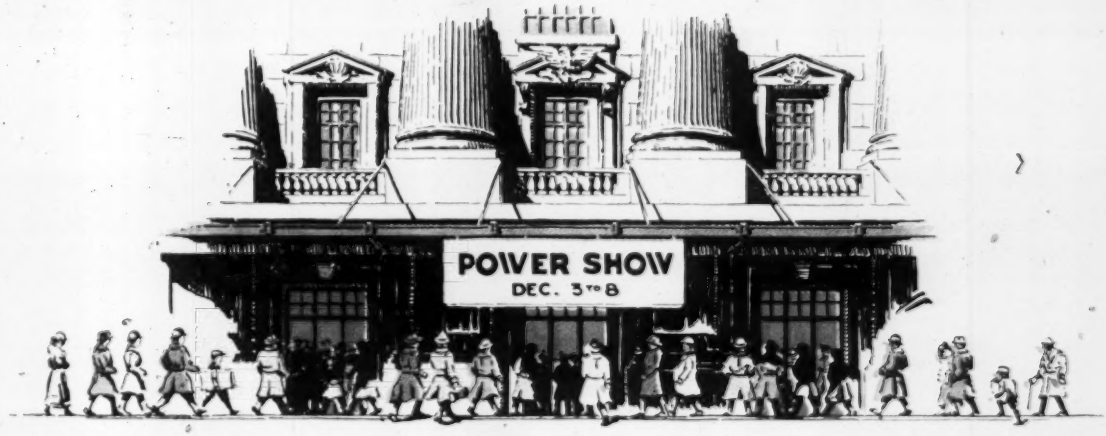
28 Vesper St. Paterson, N. J.

Canadian Representatives—Combustion Engrg. Corpn., Ltd., Toronto, Ont.
Mexican Representatives—Mine & Smelter Supply Co., El Paso, Texas

Uehling Continuous CO_2 Recorder for placing in the chief engineer's office at any distance.

CO_2 Uehling Recorders

Power Show BOOTH No. 73 Grand Central Palace - New York, N.Y. December 3rd to 8th



Straight Ahead — and turn to the right!

During the week of December 3rd, if you can possibly make it, drop everything and spend a profitable and interesting afternoon or evening at the Exposition of Power and Mechanical Engineering at The Grand Central Palace, New York City.

In this great building you will see spread before you the most magnificent display of mechanical equipment and supplies ever brought together under one roof.

Once inside, go straight ahead down the nearest aisle to the very end and *turn to the right.* This will bring you to Space 73 —the Tide Water booth.

Here you will see an exhibit of unusual interest—daylight motion pictures showing Tide Water's latest film, "America's Industries"—a model oil derrick, an exact replica of the kind used in the Southwestern oil fields and an elaborate display of oil and grease samples including the famous Tide Water Power Group.

One good turn deserves another. Come right inside our booth. You will at all times find a crowd of Tide Water men on hand to greet you. We want you to know all about Tide Water and what is behind it—our oil fields, our refinery, our products, our sales organization. . . . . One of our representatives will be glad to tell you the whole story.

And if you have any perplexing lubricating problems, he will gladly lay before you scientific recommendations for the more economical operations of your machinery—recommendations based on Tide Water's 45 years' experience in the manufacture of lubricants of the highest known quality.

Furthermore, if you need anything, any time, in the lubricating line, just write 11 BROADWAY or call WHITEHALL 6000.

It's the *right turn* for you.

TIDE WATER

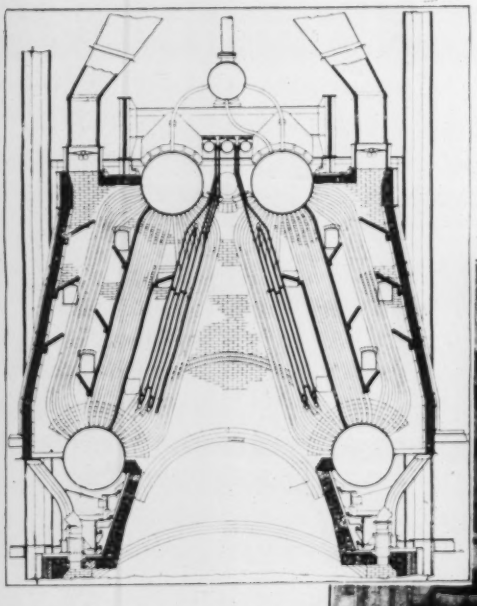
TIDE WATER OIL SALES CORPORATION

ELEVEN BROADWAY NEW YORK

Power Show BOOTH No. 56 Grand Central Palace - New York, N.Y. December 3rd to 8th

Ford THE UNIVERSAL CAR

EFFICIENCY GOVERNS SELECTION IN FORD BOILER PLANTS



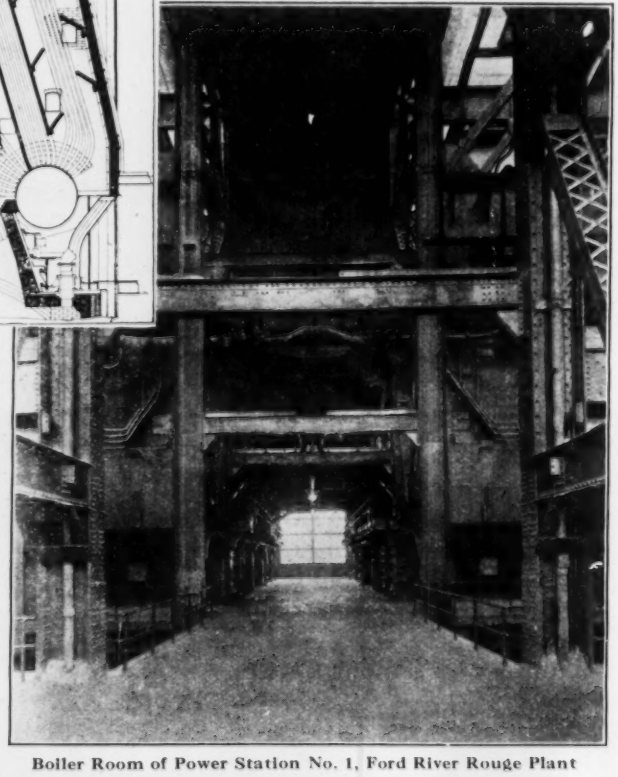
Arrangement of Elesco Superheaters in 8 Ladd Boilers, River Rouge Plant.

Ford efficiency goes deeper than shop practice. It begins in the boiler room where power is generated.

The high pressure boilers installed in Power Station No. 1 at the Ford River Rouge Plant are among the largest now in operation in the world.

ELESCO SUPERHEATERS are giving results with these boilers that are unexcelled.

Results have proved that the confidence shown by Ford engineers was not misplaced.



Boiler Room of Power Station No. 1, Ford River Rouge Plant

ELESCO

The Superheater Company

Chicago Boston Pittsburgh

45 BOILERS IN 11 FORD PLANTS
EQUIPPED WITH ELESCO SUPERHEATERS

Mr. Ford is as particular about efficiency in his boiler room as in his machine shops. The most remarkable production methods in existence are matched by boiler room efficiency.

Succeeding contracts for Elesco Superheaters at various Ford plants, irrespective of make, type and size of boilers, are placed on the basis of the performance of the preceding installation.

These Plants are as follows:

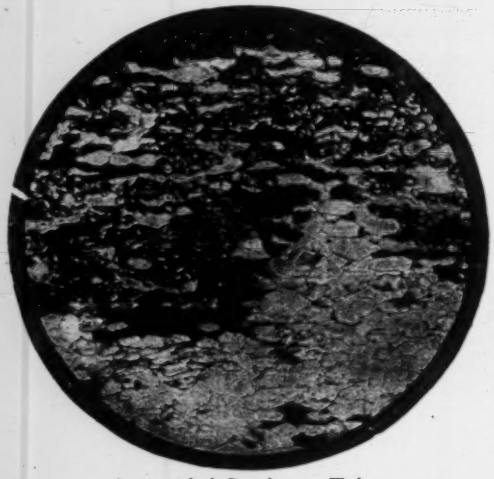
Power Station No. 1	River Rouge Plant, Detroit, Mich.
	8—2647 hp. Ladd Vertical Boilers.
Power Station No. 3	River Rouge Plant, Detroit, Mich.
	8—400 hp. Wickes Vertical Boilers.
Highland Park Plant, Detroit, Mich.	1—733 hp. Badenhausen Boiler.
	1—746 hp. McAleenan Boiler.
Cement Plant, Highland Park Plant, Detroit, Mich.	
	1—800 hp. Ladd Vertical Boiler.
Lincoln Place, Detroit, Mich.	2—500 hp. B. & W. Stirling Boilers.
Iron Mountain, Mich.	4—309 hp. Wickes Vertical Boilers.
	4—400 hp. " " "
	3—1361 hp. McAleenan Boilers.
Burnham, Ill.	4—500 hp. Connelly Boilers.
Walkerville, Ont.	3—1361 hp. McAleenan Boilers.
Kearney, N. J.	4—500 hp. B. & W. Stirling Boilers.
Buffalo, N. Y.	1—208 hp. Badenhausen Boiler.
Kansas City, Mo.	1—400 hp. Badenhausen Boiler.

Write for F-T Series Bulletins

17 E. 42nd St., New York

Canada:—The Superheater Co., Ltd., Montreal

Power Show BOOTH No. 62 Grand Central Palace - New York, N.Y. December 3rd to 8th



A corroded Condenser Tube
Mag. 75×. Etch $NH_4OH + H_2O_2$

CORROSION

AS REVEALED BY THE MICROSCOPE

AN OPPORTUNITY will be given to visitors of the Power Show to examine actual specimens of corroded tubing under a microscope.

The causes of condenser tube failures—and the steps taken to retard corrosion will be demonstrated. Engineers should take this opportunity to learn the latest developments in regard to condenser tubing.

Visit our Booth No. 62

National Exposition of Power and Mechanical Engineering—Grand Central Palace, New York

December 3 to 8, 1923

Buy Condenser Tubes on an Engineering Basis

SCOVILL CUP DRAWN Admiralty Condenser Tubing is made to the following specifications:

1. Electric Furnace Brass Composition—Copper 70% min., Tin 1% min., Zinc remainder.
2. Cupped from wrought sheet the surface of which had been milled.
3. Finished Tubes will stand an expansion of 25% min.
4. Microstructure uniformly recrystallized—.025mm. max.
5. Guaranteed against season cracking or splitting.

Meets all Navy and A.S.T.M. Specifications.

Write for Revised Edition of "Tube Facts"

BRASS MILL PRODUCTS—MFG. GOODS TO ORDER

Main Office, Mills and Factories—Waterbury, Conn.
Sales Offices:—280 Broadway, New York
10 High St., Boston 224 W. Lake St., Chicago
1213 W. 3rd St., Cleveland Penna. Bldg., Philadelphia
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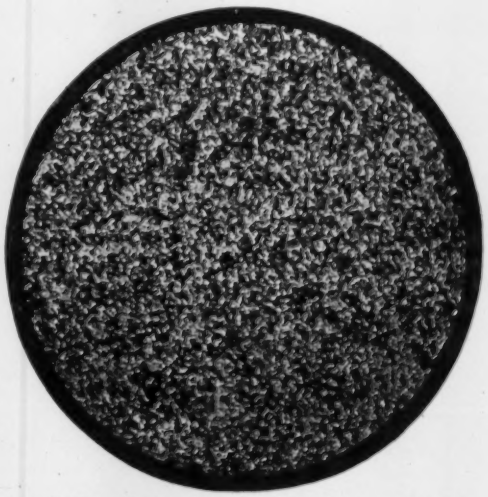
ESTABLISHED 1802
SCOVILL MANUFACTURING COMPANY



Scovill Cup Drawn Admiralty Condenser Tubing
Mag. 75×. Etch $NH_4OH + H_2O_2$

Power Show BOOTH No. 322 Grand Central Palace ~ New York, N.Y. December 3rd to 8th

THE A. & F. BROWN CO.

ENGINEERS,
FOUNDERS, MACHINISTS & MILLWRIGHTS.

POWER TRANSMITTING MACHINERY

A SPECIALTY

HEAVY MACHINE WORK AND HIGH GRADE CASTINGS

MAIN OFFICE AND WORKS
ELIZABETHPORT, N. J.

ENGINEERING SALES OFFICE
79 BARCLAY ST., N. Y.

TURNED STEEL SHAFTING

We make tool turned shafting of high tensile strength from homogeneous hot rolled steel bars which permits key seating without tendency to buckle.

Our tool turned shafts **are round** and **specially straightened,** both essential points in avoiding unnecessary friction in bearings and running true, especially at high speeds.

CAST IRON SPLIT PULLEYS

We recommend our Split Cast Iron Pulleys for general line shafting and countershafts, as they possess a greater number of superior merits than any pulley on the market. They are bored to clamp to the shafts and are as strong and well balanced as whole pulleys.

We make "Single Belt" Pulleys and "Double Belt" Pulleys for normal speeds, both "Whole" ("Solid") or Split; also Motor Pulleys and special pulleys for very heavy duty and for unusual high speeds.

Cast Iron Pulleys correctly designed of proper mixture of iron and well finished are still the unit of comparison and the many claims of other types as "just as good" or "better than," are yet to be substantiated.

DOUBLE BRACED ADJUSTABLE HANGERS

The original double braced adjustable hanger with F. Brown's patent metallic wick self oiler (copied by many but never equaled). This oiler will not clog or glaze, and the freedom of feed maintains a film of oil between shaft and bearing. **The shaft runs in oil.** Many of these hangers have been in constant use for 35 to 40 years without rebabbitting, and are still in good condition.

Where there is friction there is wear. When the wear is not appreciable there can not be much friction.

F. BROWN'S FRICTION CLUTCH

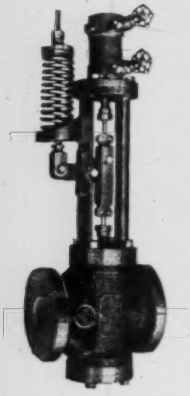
Simple, compact, having few small parts.

Engages gradually, and when thrown in gear has a stronger grip than any other. Especially adapted to heavy duty and high speed.

WE DESIGN, BUILD AND ERECT

TRANSMITTING MACHINERY FOR ROPE DRIVES, BELT DRIVES, GEAR DRIVES, ETC.

Power Show BOOTH No. 59 Grand Central Palace - New York, N.Y. December 3rd to 8th

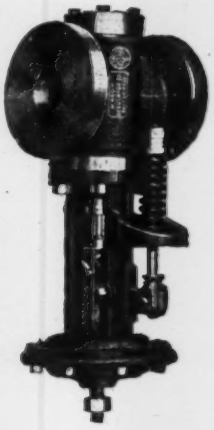


Mason Boiler Feed Line Regulator

For controlling steam-driven boiler feed pumps. Size ½ in.-1½ in. bronze body. Size 2 in.-4 in. iron body, bronze mounted.

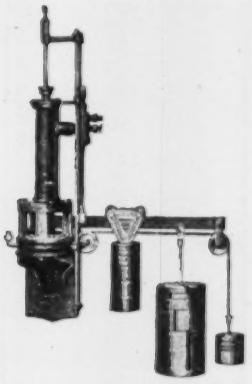
Mason Standard Reducing Valves

Reduces and maintains even pressure of steam and air regardless of the variation of the initial pressure or of the volume of steam and air required. Sizes ½ in.-2 in. bronze body. Sizes 2 ½ in.-10 in. iron body, bronze mounted.



Mason Pump Regulator

For controlling the discharge pressure of steam-driven pumps—10 to 150 lb. pressure. Sizes ½ in.-1½ in. bronze body. Size 2 in.-4 in., iron body, bronze mounted.



Mason Hydraulic Damper Regulator

Assures accurate regulations of boiler pressure—Double Acting—positive movement and actuated by water pressure in both directions. Equipped with 2¼ in., 3 in., 4 in. and 5 in. diameter operating cylinder.

Better Control

of Operating Pressures Reduces Boiler Room Costs

There can be no dispute about this. It is virtually an axiomatic truth. The only question is, how are you going to get it?

For forty years the Mason Regulator Company has specialized in the development and manufacture of dependable automatic Pressure Regulating Devices for the control of steam, air and water, in all lines of service—heating, power and process work.

MASON Regulators are conspicuous for accuracy, low maintenance and absolute dependability. Buy them through your dealer. Write us for Catalog.

TRADE MARK MASON MASON

MASON REGULATOR CO.

Adams & Medway Sts., Boston, Mass.

Power Show BOOTH No. 14A Grand Central Palace - New York, N.Y. December 3rd to 8th

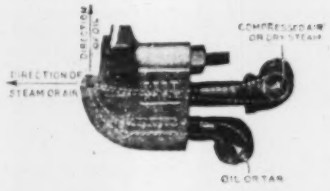
Liquid Fuel Means—

temperature control within 10°
increased steam capacity
no fuel or ash handling

THE use of liquid fuel also means that fires can be instantly lighted and furnaces or boilers brought to working temperature; temperature can be controlled within 10°. Liquid fuel occupies but one-third space of its equivalent in coal. You will get the maximum efficiency from liquid fuel by using

W. N. Best "CALOREX" Burners
and Oil-Burning Equipment

W. N. Best equipment is the product of 34 years of experience in liquid fuel combustion. Each type is designed for a specific use—boiler work, heat-treating, welding, etc. Careful design, rigid testing, and correct installation of W. N. Best equipment are enabling 12,000 manufacturers to reduce fuel costs and to increase production.



"CALOREX" Burner

External atomizing—no tubes or needle points to clog or carbonize.

Burns fuel oil, crude oil, or tar.

Can be designed to throw a long, narrow flame or a fan-shaped flame up to 7 feet in width.

Simple to operate—only one control valve.

Economical.

Successfully Used in—

High-Pressure Boilers
Low-Pressure Boilers
Heat-Treating
Brazing
Melting
Forging
Welding
Smelting
Pipe-Bending
Tempering
Glass
Rolling Mill Work
Cement Kilns
Potteries
Locomotives

48,000 Burners in Use

Throughout the United States and in many foreign countries, in every line of business, 48,000 W. N. Best CALOREX Burners are giving efficient, economical service. They can be applied in your own plant with equal success. In fairness to yourself give us the details of your business—type of work, plant, horsepower, etc.—and without obligation let us show you exactly what saving you will effect.

If you want to reduce costs—write today

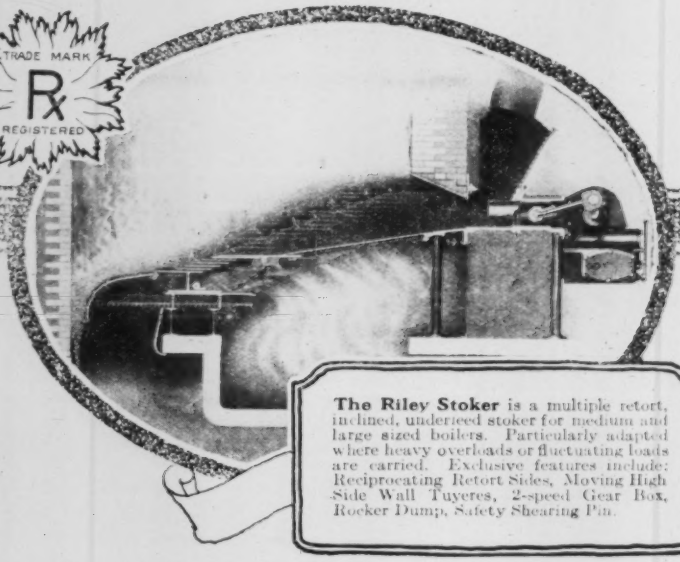
W. N. BEST Corporation
Engineers in Caloric
11 Broadway New York, N. Y.

Visit our Demonstration—Booth 14A, 1st Floor

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

Power Show BOOTH No. 79 Grand Central Palace - New York, N.Y. December 3rd to 8th

TRADE MARK Rx REGISTERED



The Riley Stoker is a multiple retort, inclined, underfeed stoker for medium and large sized boilers. Particularly adapted where heavy overloads or fluctuating loads are carried. Exclusive features include: Reciprocating Retort Sides, Moving High Side Wall Tuyeres, 2-speed Gear Box, Rocker Dump, Safety Shearing Pin.

A Type for Every STOKER Need

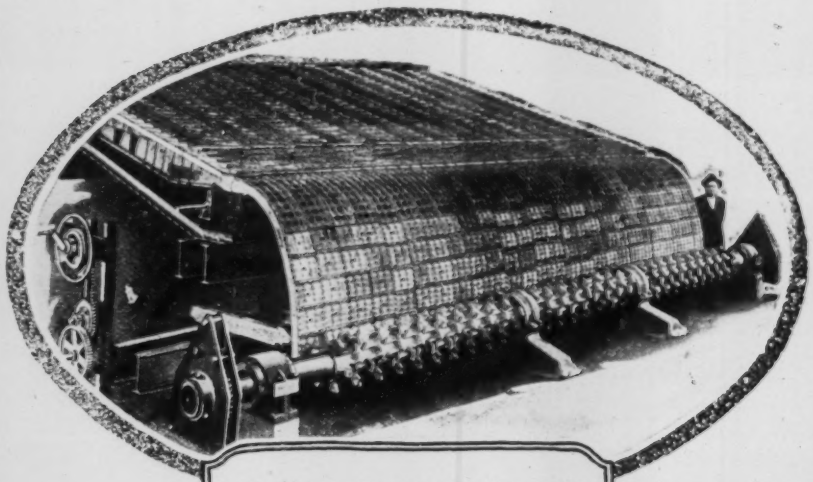
Whether you use big boiler or small boiler, good coal or poor coal, forced draft or natural draft,

We have a type that you will like

STOKER MANUFACTURERS ASSOCIATION SMA

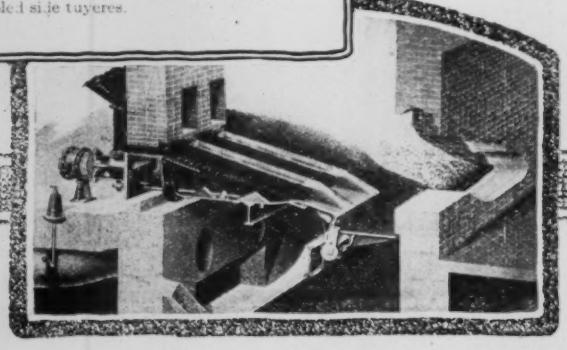
Dealing in Facts—
Because the future of automatic stoking rests upon the ethical standards of the men and firms behind the industry—because its present standing can be preserved only by eliminating of exaggerated claims—the Stoker Manufacturers Association, of which this organization is a part, has made the honest dealing in facts one of the qualifications for membership.

BURN COAL
"The *basic* fuel"

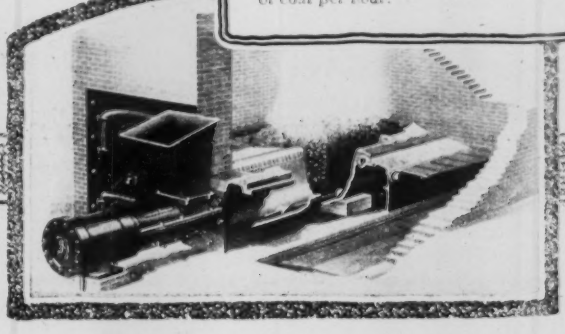


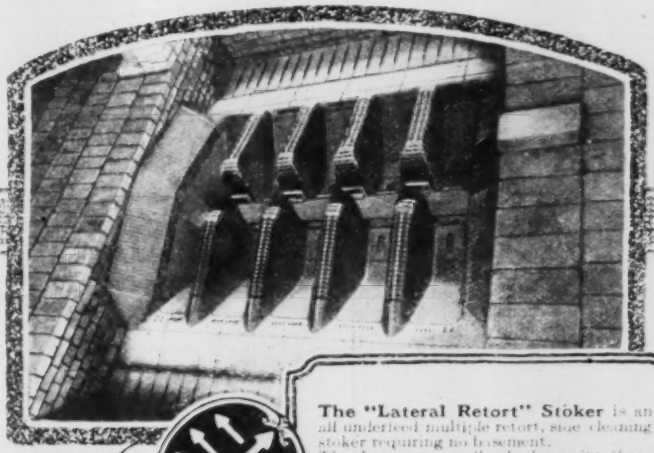
The Riley "Super-Stoker" is made for the large central stations and industrial plants where high capacity and maximum efficiency are desired. Built in depths up to 20' and having a coal burning capacity per retort up to 3000 pounds of coal per retort per hour, it is applicable to boilers of large size.

The Jones "A-C" is a steam-driven, multiple retort, underfeed stoker for use with boilers from 300 H.P. up. Characteristic features include a large retort volume, complete absence of avalanching, individual control of retorts and high, air-cooled side tuyeres.

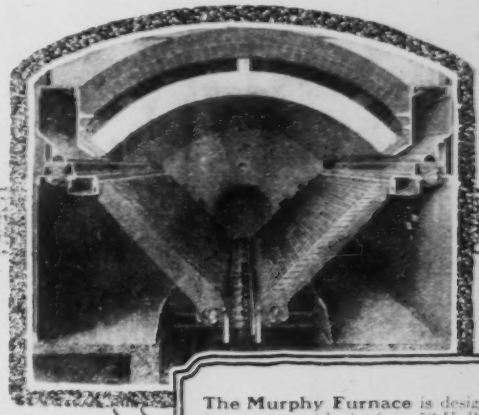


The Jones "Standard" Side Dump Stoker has the basic Jones features and in addition a side dump, forming a self-cleaning mechanism. Only slight excavation is required; the cost is low. This stoker gives high efficiency and has a fuel burning capacity of 1,200 to 1,800 pounds of coal per hour.





The "Lateral Retort" Stoker is an all underfeed multiple retort, side cleaning stoker requiring no basement. This brings to smaller boiler units (from 150 H. P. to 500 H. P.) the proved advantages of underfeed, multiple retort, stoker firing.



The Murphy Furnace is designed for any type of boiler from 50 H. P. up to the larger sizes for which the multiple retort underfeed stoker is best suited. It is a natural draft furnace and requires no fan or blower equipment. Particularly suited for small or medium size boilers carrying a steady load.

At Booth No. 79

You are cordially invited to visit Booth No. 79 and see our display which will be of particular interest to power plant managers and engineers interested in efficient combustion.

See the "Lateral Report" Stoker—the all-underfeed, side cleaning stoker which has won such wide acceptance during the past year—set up and in working order.

See the motion pictures showing the actual operation of underfeed stokers. From coal bunker to ash hopper you actually see just what happens including pictures of the fire. Boiler room operation is brought to the exposition floor.

Our representatives will be glad to give you full information and literature covering the service we are prepared to render in the combustion field.

SANFORD RILEY STOKER CO.

"RILEY" Underfeed Stokers — "JONES" Underfeed Stokers — "MURPHY" Automatic Furnaces

GROUND COAL ENGINEERING CORP. Pulverized Coal Installations

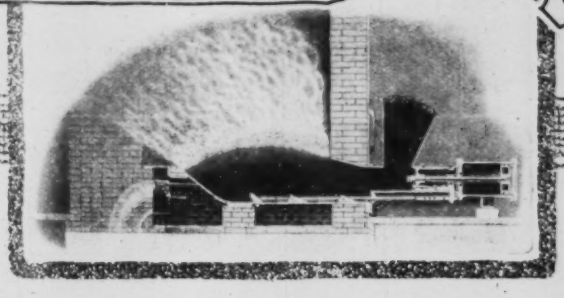
9 Neponset Street, WORCESTER, MASS., U. S. A.

BOSTON NEW YORK PHILADELPHIA PITTSBURGH BUFFALO CLEVELAND DETROIT
CINCINNATI CHICAGO ST. PAUL KANSAS CITY DENVER CHARLOTTE DALLAS

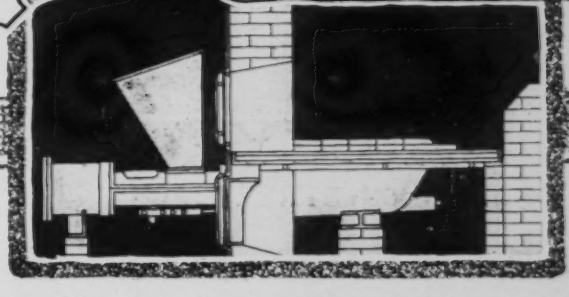
The **UNDERFEED STOKER COMPANY OF CANADA, LTD., TORONTO**

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

The Jones "Standard" Stoker is applied to boilers from 50 H. P. to 150 H. P. It is moderate in first cost, and since it requires practically no excavation for installation, can be economically installed in existing plants. This stoker has a fuel burning capacity of 800 to 1,200 pounds of coal per hour.



The Jones "Industrial" Furnace Stoker is used in industrial heating operations, metallurgical and chemical furnaces. Fuel burning capacity is 60 to 800 pounds of coal per hour.



Power Show BOOTH Nos. 54-55 Grand Central Palace - New York, N.Y. December 3rd to 8th

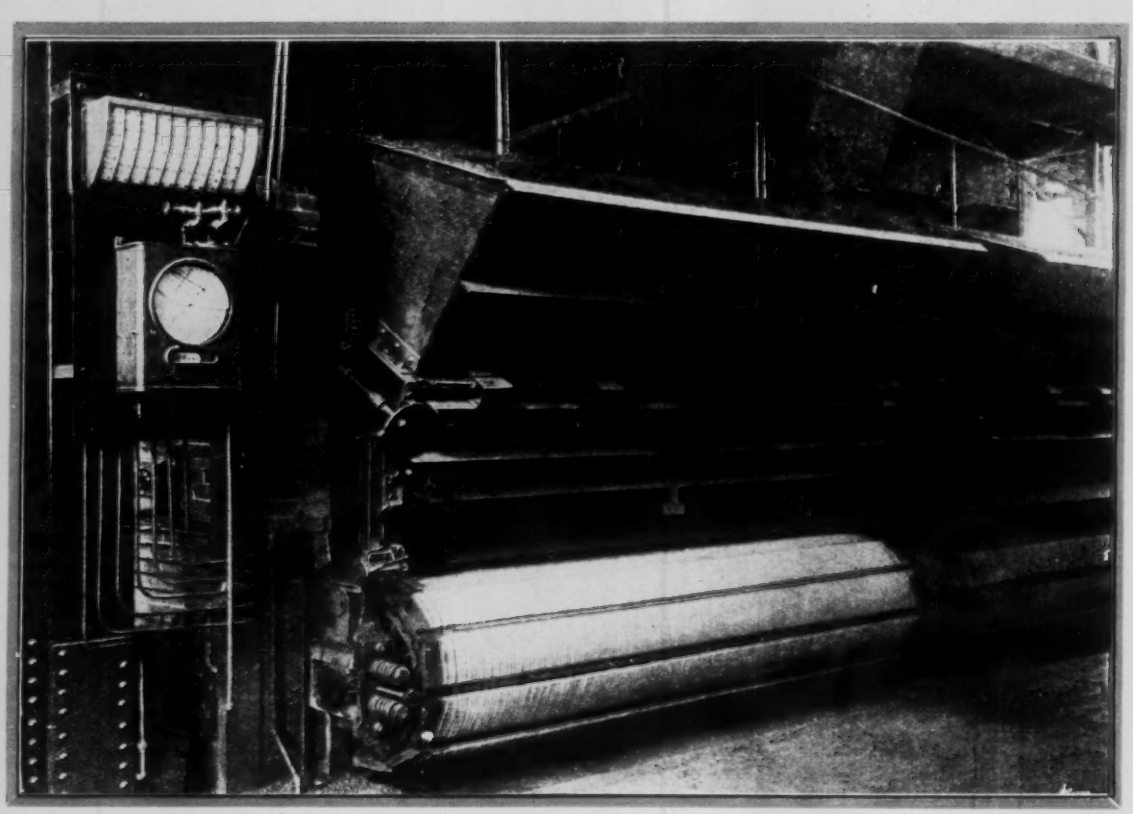
SEE OUR EXHIBIT

AT THE

POWER SHOW

GRAND CENTRAL PALACE—NEW YORK CITY

DECEMBER 3rd to 8th, 1923



YOU WILL FIND THE FOLLOWING OF INTEREST

A section of glass pipe including fittings through which water will be circulated at different rates of flow to demonstrate the effect of the various fittings upon fluid flow.

The new Bailey Flush Front Meters which are designed for meter board mounting where an exceptionally neat appearing installation is desired. The meter casing and all connecting piping is behind the panel board.

There will be a complete display of Multi-Pointer Gages including practically all sizes and types.

Totalizing Boiler Meter (for use on double outlet boilers).

Recording and Indicating Tachometers for stoker speed, turbine speed, fan speed, pump speed, etc.

Gas Meter with Pressure Compensator in operation.

DESCRIPTIVE BULLETINS ON REQUEST.

BAILEY METER COMPANY

2009 EAST 46th STREET CLEVELAND, OHIO

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TRADE MARK

PASSENGER and FREIGHT ELEVATORS

SELF-LEVELING ELEVATORS

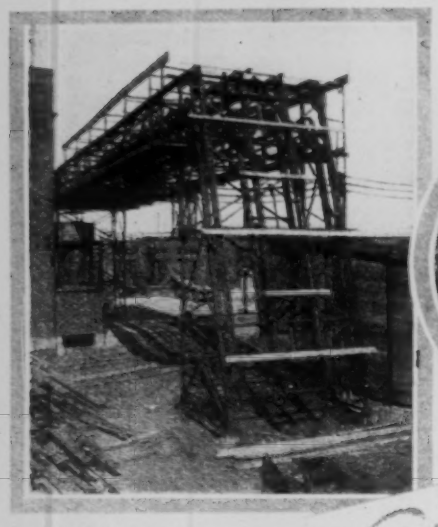
AUTOMATIC HOISTING EQUIPMENT
for Blast Furnace and Similar Service

ESCALATORS—CONVEYORS

Otis Elevator Company

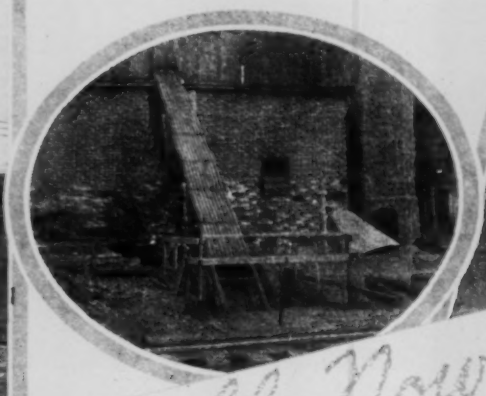
Offices in All Principal Cities
of the World

Power Show BOOTH No. 323 Grand Central Palace - New York, N.Y. December 3rd to 8th



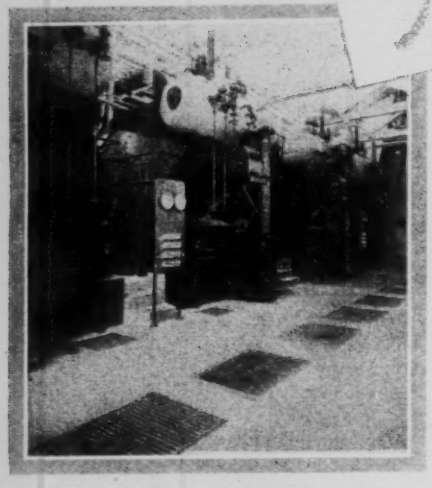
G-W Lumber Conveyor

G-W Flight Conveyor



G W Platform Conveyor

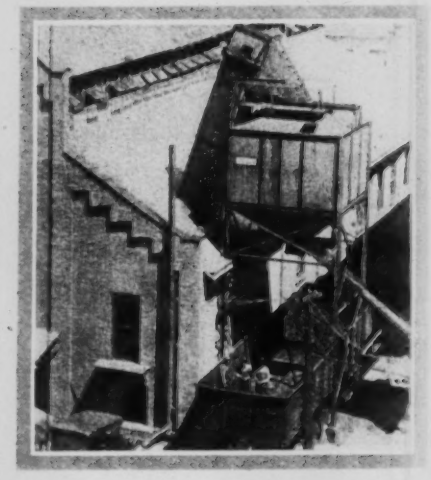
Available Now! Plenty of Help



G-W Coal Elevators and Conveyor

—permanent, economical, and highly efficient mechanical handling "labor." Adaptable to a wide variety of duties, indoors and out.

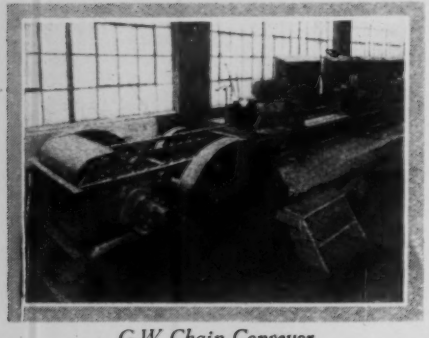
It is available in many forms, only a few of which are here illustrated. It meets hundreds of elevating and conveying requirements — many of which probably exactly parallel yours.



G-W Ash Elevator

Complete information regarding this G-W Equipment will gladly be supplied at Booth No. 323 Power Show, or by our nearest office below.

Main Office: 18 Hill St., Hudson, N. Y.
District Offices:
New York, 50 Church St. Boston, 24 Milk St.
Chicago, 565 W. Washington St.
Pittsburgh, Peoples Bank Bldg.
Plants: Hudson, N. Y. and Oakmont, Pa.



G-W Chain Conveyor

G-W Belt Conveyor

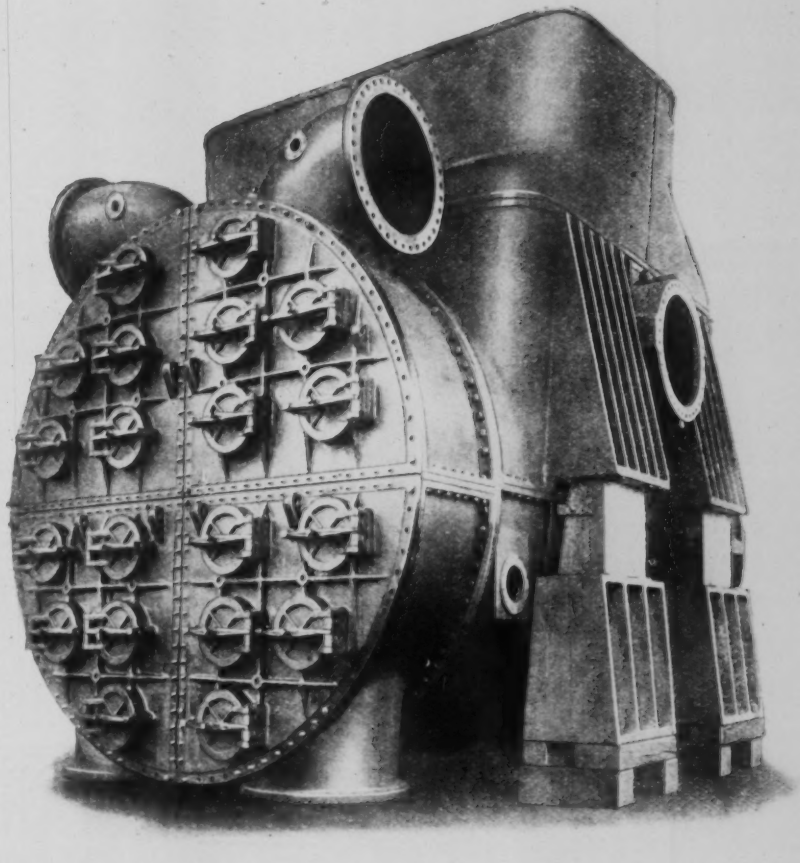
Gifford-Wood Co.

BUILT STRONGER LASTS LONGER

MATERIAL HANDLING EQUIPMENT

Power Show BOOTH No. 64 Grand Central Palace - New York, N.Y. December 3rd to 8th

ENGINEERS SHOULD NOT BE SATISFIED TO MERELY KEEP THEIR PLANTS RUNNING!



A Wheeler 45,000 Sq. Ft. Compartment Type Condenser

WHERE EFFICIENT AND MODERN WHEELER CONDENSING APPARATUS is installed in many small and large plants, owners realize that they are keeping at the head of the list of stations which are getting the most out of a pound of coal.

Apparatus which is helping them to maintain efficient and reliable operation are:—

WHEELER Surface, Jet or Barometric Condensers.
WHEELER Steam Jet Air Pumps.
WHEELER Centrifugal Pumps.
WHEELER Evaporators.
WHEELER Cooling Towers.

It will pay you to investigate the Wheeler Condensing Apparatus which our catalog 112-C describes.

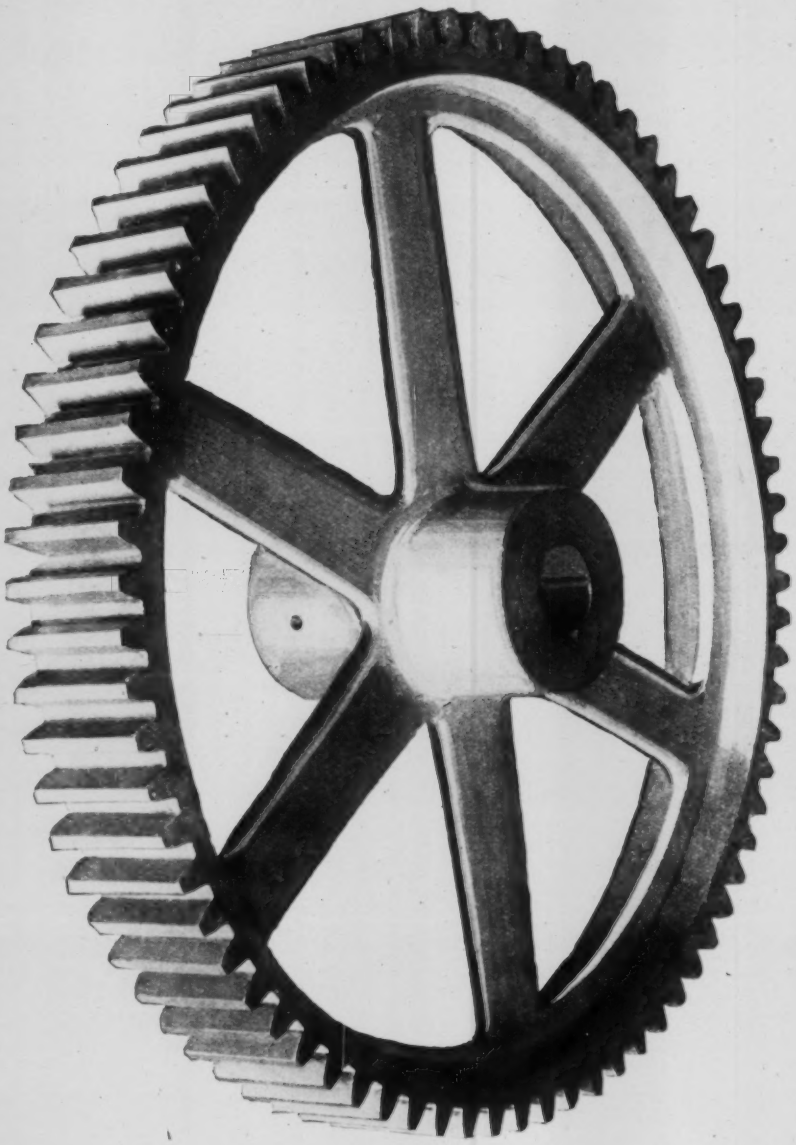
See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

Wheeler Condenser & Engineering Company

CARTERET, NEW JERSEY

Power Show BOOTH No. 11 Grand Central Palace - New York, N.Y. December 3rd to 8th

Get Our New Catalog
—
It's interesting and full of data
—
Glad to Send One to You



New York Sales and Engineering Office:
50 Church St.

MEMBER OF AGMA

SPUR GEARS UP TO 160" DIA. 30" FACE

HERRINGBONE GEARS UP TO 160" DIA. 30" FACE

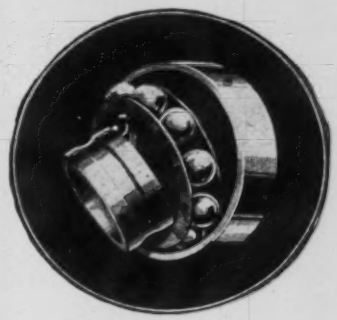
Philadelphia GEAR Works 1120-1128 Vine St Philadelphia

Power Show BOOTH No. 224 Grand Central Palace ~ New York, N.Y. December 3rd to 8th

How Precision Affects Production

To maintain maximum plant output, each productive unit must be kept at top speed, all the time. Only the best machines, with maximum wear resistance, can stand this speed service. Precision—everywhere desirable in a high-duty machine—is fundamentally requisite in the bearings, where the heaviest friction load must usually be carried. For inaccuracies of small moment at moderate speeds, manifest themselves at high speeds in destructive vibration, with excessive friction and wear.

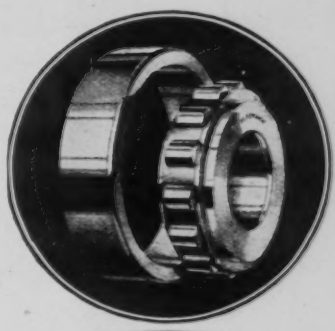
PRECISION BEARINGS



"NORMA"

BALL BEARINGS

Experience has proved that these high-precision units are preeminently adapted to conditions where maximum serviceability and freedom from vibration are sought, under high-speed operation. They have all the load-carrying capacity of any ball bearing, with a speed-ability which no other ball bearing possesses. They have long been the standard bearings in all high-grade automotive magnetos and lighting generators. And other notably successful applications are high-speed grinders and drills, fractional h.p. motors, and electrical utilities.



HOFFMANN

ROLLER BEARINGS

These high-precision, heavy-duty units are designed for conditions involving heavy loads, shocks, jars and vibrations. They have all the speed-ability of the best ball bearings, with a much greater steady load-carrying capacity and with a temporary overload capacity as under shocks and in starting, which no ball bearing has. They are made in the same standardized sizes as ball bearings, in both standard and self-aligning types—some of the latter being wholly enclosed and lubricant-packed. "Hoffmann" Roller Bearings have brought high anti-friction bearing economies into the heavy-duty field where they were never before available.

"NORMA" engineers will welcome an opportunity to work with yours, in applying these high-precision bearings with a view to increased production, greater power savings, and reduced up-keep costs.

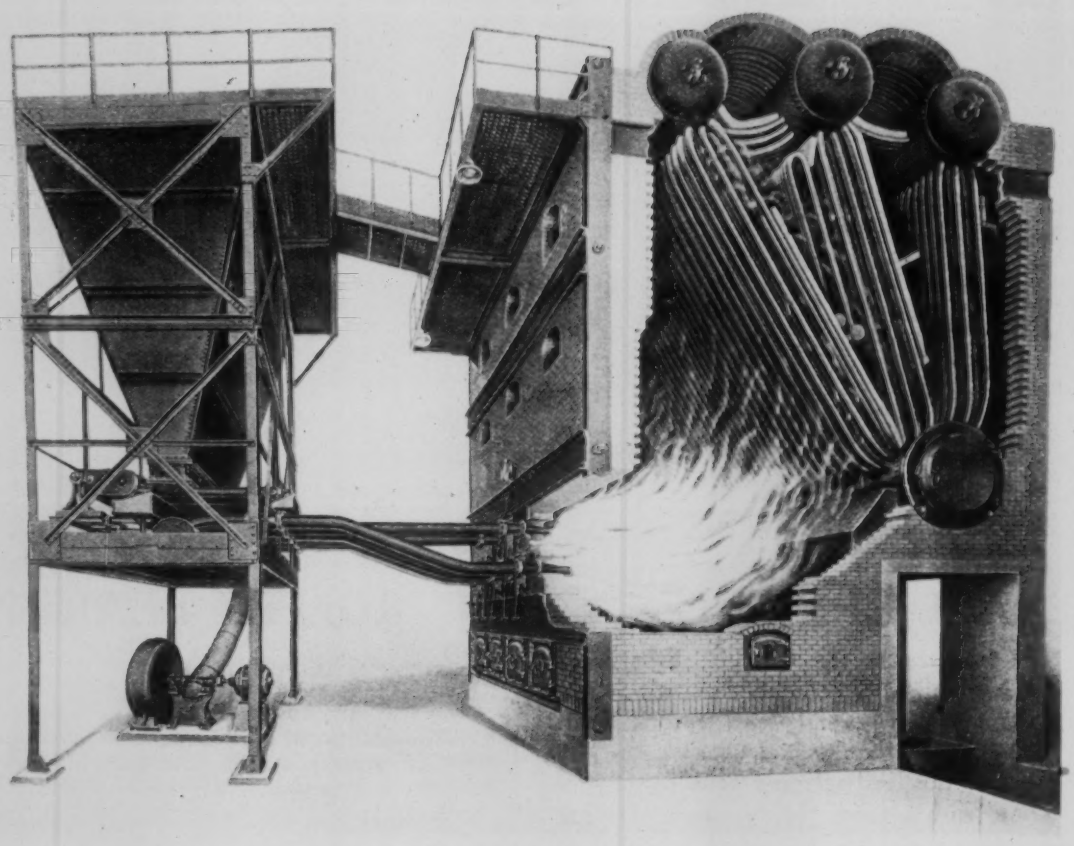
THE NORMA COMPANY OF AMERICA

Anable Avenue Long Island City New York

BALL, ROLLER AND THRUST BEARINGS

Power Show BOOTH Nos. 262 & 279 Grand Central Palace - New York, N.Y. December 3rd to 8th

PULVERIZED COAL *for* BOILERS



That is the title of Bulletin No. 900—Just off the press, ready for distribution at the Power Show.

Booths Nos. 262 and 279

This bulletin describes and illustrates the Equipment and Designs most universally used in preparing and applying this

ECONOMICAL FUEL

Call or write for your copy

FULLER-LEHIGH CO.

Main Office and Works
FULLERTON, PA.

Lessee Quigley Fuel Systems Inc.

New York, N. Y.
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London, Eng.
25 Victoria St
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Sydney, N. S. W.
79-81 Pitt Street

Power Show BOOTH No. 13 Grand Central Palace - New York, N.Y. December 3rd to 8th

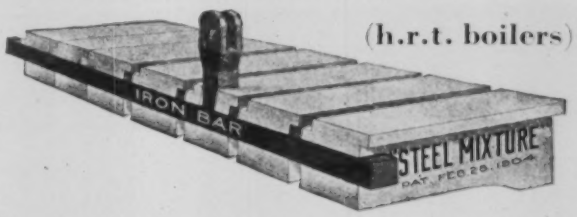
Some of the **STEEL MIXTURE** REG. U.S. PAT. OFF. Money Savers

Veneer Furnace Lining

STEEL MIXTURE Veneer Lining extends inward for only part of the thickness of the fire wall, the rest of which can be built from standard fire brick.

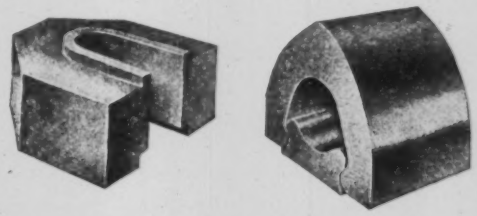
This construction is highly desirable in that the part of the fire wall which gets the least punishment is built from cheaper material and becomes permanent, while the exposed portion can be renewed with less physical effort and with smaller expense for new material. Inasmuch as the destructive influences, even under the severest duty, seldom impair more than the fire surface, the bulk of the fire wall remains intact and uninjured during the reconstruction period, and maintains the strength of the entire wall structure while the veneer surface is being replaced.

Foote Back-Combustion Chamber Arch (h.r.t. boilers)



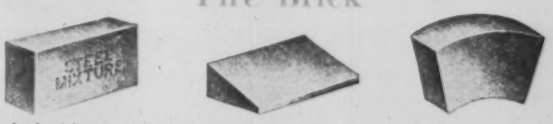
Forms a complete gas-tight cover for the back combustion chamber and protects the flue sheet below the water line. Curved underneath to deflect gases into the flues and gives plenty of room for working with the tubes. Erected in an hour and outlasts the boiler.

Blow-Off Pipe Protection (h. r. t. boilers)



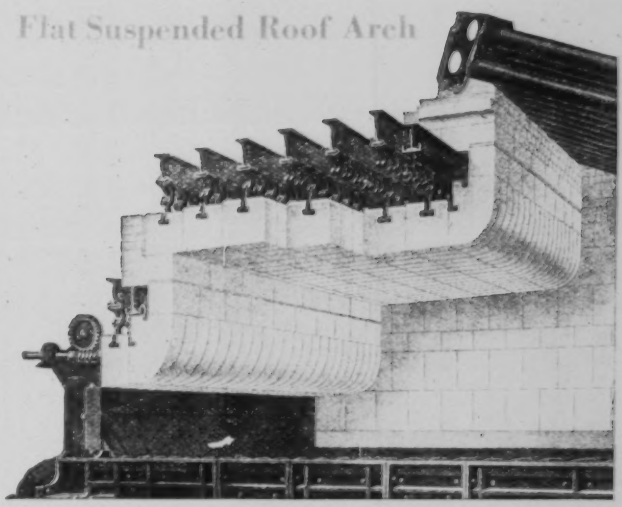
Fitted around or removed from the pipe in a few minutes. Better than masonry piers and the pipe is accessible for inspection.

Fire Brick



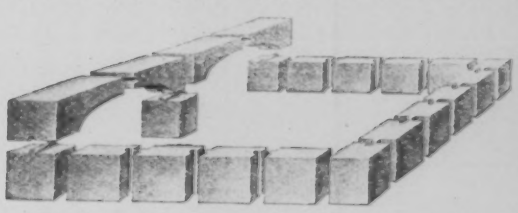
All desirable standard shapes in stock, and specials made for any purpose. Complete or partial refractory equipment for all boilers, metallurgical furnaces, ovens, etc.

Flat Suspended Roof Arch

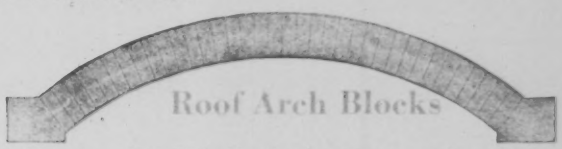


Each block independently suspended for easy removal from either *above or underneath* and *without disturbing others*. All blocks hang straight downward and without crushing stresses on their neighbors. Joints of arch with boiler walls are gas-tight and completely cushioned to make expansion harmless. Design flexibility to meet needs of any water-tube boiler or topped furnace.

Boiler-Door Arches and Fire-Box Blocks



The strongest furnace wall construction that can be put into a boiler. Saves time and labor in erecting and greatly lessens the number of joint corners and edges in the fire surface. Lasts twice as long as small brick. Shortens furnace shut-downs, and assures rigid, well aligned, gas-tight structure. Sizes for any furnace needs and for any number and size of door openings.



Furnished complete with skew-backs, for any radius from 4 to 10 feet. The fit is always tested before shipment.

Baffle Tile

Shapes and sizes for all popular makes of boilers.

McLEOD & HENRY CO.

Specialists in Furnace Refractories for almost 100 years

Main Office and Works:- Troy, N. Y.

Branches: New York, Boston and Detroit

Power Show BOOTH No. 93 Grand Central Palace - New York, N.Y. December 3rd to 8th

ENGELHARD

A NEW ELECTRIC

CO_2 RECORDER

WILL BE SHOWN IN

BOOTH No. 93

This works on the thermal conductivity principle and uses no chemicals. Continuous records from as many as six boilers can be made on one chart. CO_2 and flue gas temperatures can also be recorded on the same chart.

WE SHALL ALSO HAVE AN INTERESTING EXHIBIT OF

THERMO-ELECTRIC PYROMETERS

AND

ELECTRIC RESISTANCE THERMOMETERS

The pyrometers and electric thermometers will be such as are applicable to power plant work. Readings of feed water, economizer, superheat and flue gas temperatures can be easily centralized by the use of the equipment, which can be made either indicating or recording.

Do not fail to inspect carefully the

ENGINEERS PORTABLE TEST SET

CHARLES ENGELHARD, INC.
30 CHURCH STREET
NEW YORK - U·S·A·

Power Show BOOTH Nos. 87-88 Grand Central Palace ~ New York, N.Y. December 3rd to 8th

The G&G ELECTRIC Telescopic Hoist

Labor Saving Ash Removal

THE Model D electrically operated Hoist provides a safe, speedy and economical method for ash removal in larger buildings.

The sidewalk opening is completely safeguarded by the G & G sidewalk doors and spring guard gates, which open and close automatically as hoist is raised and lowered.

The overhead crane makes it possible to raise cans directly from boiler room floor to top of truck, and deposit ashes in truck without rehandling at grade.

At the Mergenthaler Linotype Co., Brooklyn, N. Y. (distance between boiler room floor and grade level 12 ft. 0 in.) one of these Hoists was tested for current consumption by Engineers of General Electric Co. It was found capable of raising and lowering 78 cans per k.w.h., or at a money cost of 26 cans for one cent.

If you will tell us the quantity of ashes you average daily, distance of lift and something about the working conditions of your plant (submit sketch if possible) we will recommend type of hoist to use and give you cost. Illustrated booklet upon request.

At the POWER SHOW, Grand Central Palace, New York City, you can see G & G ash removal equipment in actual operation. Don't miss this feature at the Show.

GILLIS & GEOGHEGAN

521 West Broadway New York City

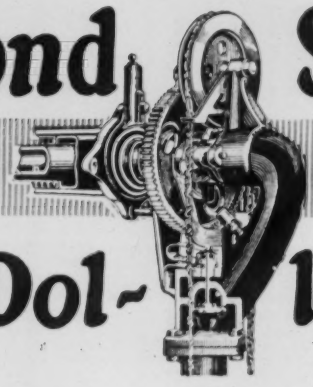
Model D Electrically Operated Hoist at Liberty Street Telephone Building Boston, Mass.

Densmore and Le Clear Architects

Distance between boiler room floor & grade level is 24 ft. 6 in.

Power Show BOOTH No. 17 Grand Central Palace - New York, N.Y. December 3rd to 8th

The Diamond Soot Blower



Story in Dollars and Cents

HERE is a comparison between blowing a boiler by the hand lance method and by mechanical soot blowers of both the independent valve type and the Valv-in-Head type. A 500 h. p. boiler is assumed, 200 lb. steam pressure, operating at 175 per cent rating, on a basis of the boiler being operated 300 days of 20 hours each per day, with an evaporation of 8 lbs. and a coal cost of $5.50 per ton fired under the boiler. The figures are based on the boiler being blown twice a day with mechanical soot blowers as against once a day with hand lance.

Steam consumption is figured on the basis of each soot blower valve being open a total of 60 seconds each time the boiler is blown in the case of the independent valve blower and 30 seconds in the case of the Valv-in-Head blower. Hand lance steam consumption is figured on a total flow of 20 minutes through a ¾" nozzle.

Operating Cost per Year with Hand Lance

Steam	$300
Labor (2 hrs. per day)	240
Maintenance	25
	$565

Operating Cost per Year with Mechanical Blowers

	Independent Valve Type	Valv-in-Head
Labor	$ 60	$ 36
Steam	184	92
Interest at 6 per cent	40	45
Depreciation and maintenance 20 per cent	132	148
	$416	$321
Decrease in operating cost due to mechanical blowers	$149	$244

Many actual tests have demonstrated that the savings in fuel effected by mechanical soot blowers over the hand lance run from 2 to 8 per cent.

A boiler operating under the conditions named would consume 10,500 tons of coal in a year's time. Figured at $5.50 a ton, this would amount to $57,700 per year.

1% saving in fuel would amount to $ 577
2% saving in fuel would amount to $1150
3% saving in fuel would amount to $1730
4% saving in fuel would amount to $2310
5% saving in fuel would amount to $2885
6% saving in fuel would amount to $3460

From the above it will be seen that soot blowers commonly pay from 125 per cent to 800 per cent per year on the investment.

Ask for Bulletin 237

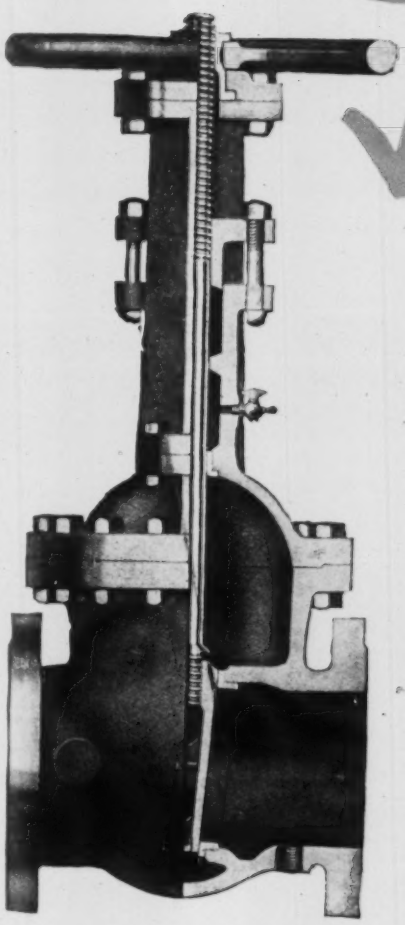
DIAMOND POWER SPECIALTY CORPORATION
Detroit-Michigan

Diamond
Soot Blowers-Save 4 to 8% Fuel

Power Show BOOTH No. 2 Grand Central Palace - New York, N.Y. December 3rd to 8th

CHAPMAN

Guaranteed to 1928!



—to CONTROL Superheated Steam

Here is a Cast Steel Gate Valve backed by a definite 5-year GUARANTEE. We can make this guarantee because WE KNOW this Valve. It is built especially for high pressure. Body and cap of cast steel. Spindle of rolled monel. Spindle seats and seat rings of cast monel. And observe the long neck, so designed that the intense heat cannot reach the packing. Ask any man who has installed "List 63½" and we will stand or fall by his say-so, not ours. Fully described in the Chapman Catalog. Send for your copy.

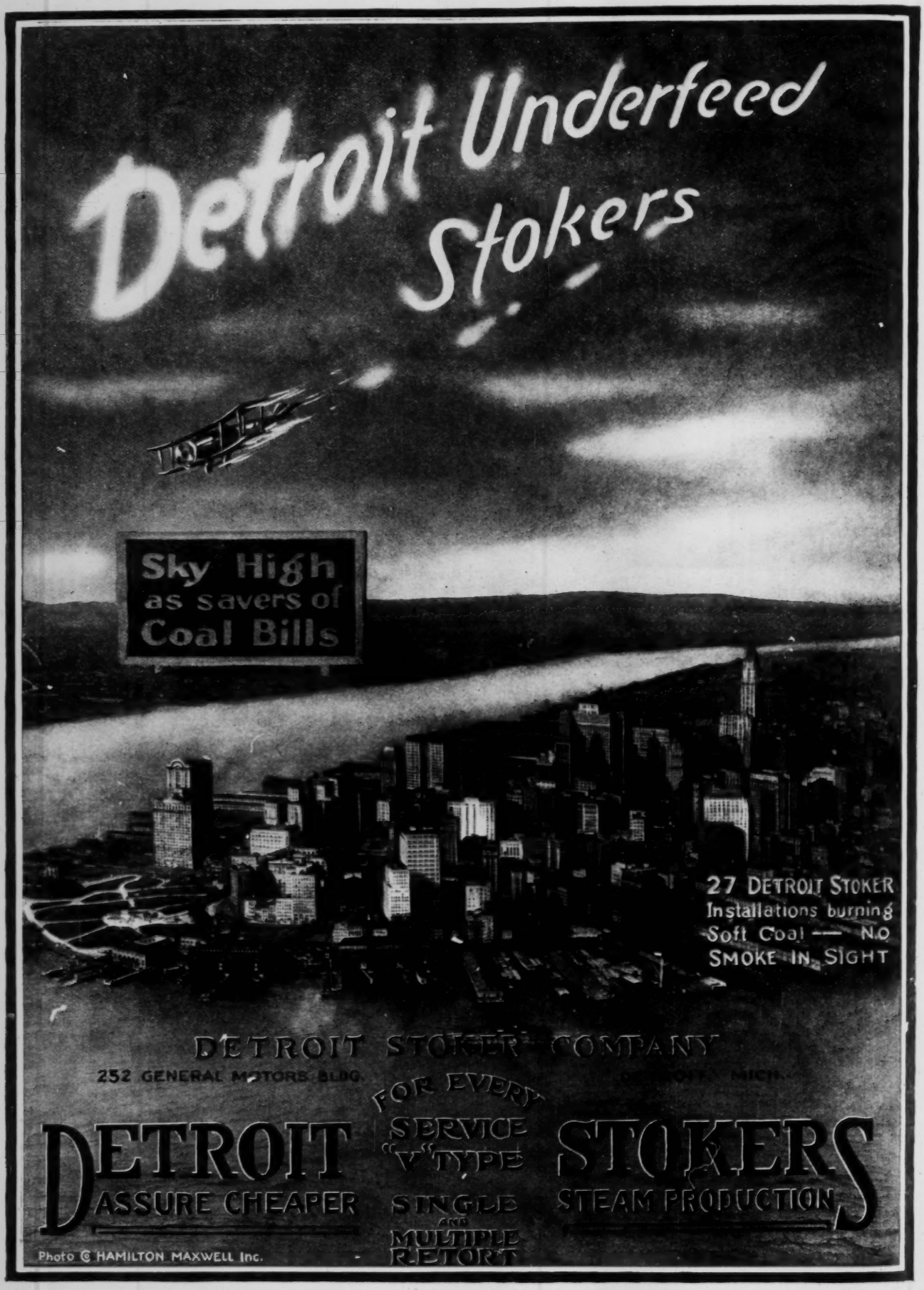
The Chapman Valve Mfg. Company
Indian Orchard, Mass.

BRANCHES:

New York	Pittsburgh	Detroit	Chicago
Boston	Philadelphia	Cleveland	Los Angeles
Tulsa	San Francisco	Houston	Syracuse

VALVES

Power Show BOOTH Nos. 203-204 Grand Central Palace - New York, N.Y. December 3rd to 8th



Power Show BOOTH Nos. 264 & 277 Grand Central Palace - New York, N.Y. December 3rd to 8th

Wayne Water Softeners

Provide a Most Efficient Means for Supplying Soft Water for Industrial Purposes

See the Wayne exhibits at the Power Show—Grand Central Palace, New York, December 3rd to 8th, Booth 376.

The Wayne Water Softener employs an interesting chemical exchange method.

By this process any hard water is converted into soft water free from lime and magnesia, simply by filtration.

When the softening capacity is reached the system undergoes a short regeneration process, which is accomplished by passing a salt brine through the softener for a few minutes, which is converted into hard water and washes out to the drain.

This process quickly regenerates the system so that it is again ready to soften water.

The rapid and complete action of the Wayne Water Softener makes it possible to convert hard water into 100 per cent soft water, which is guaranteed not to form scale in boilers, heaters or pipes.

The cost of operation is the lowest of any water softening apparatus.

Wayne Water Softener is a distinct economy for supplying soft water for boiler feed purposes, public buildings, institutions, and for a large variety of industrial uses.

The application of the Wayne system is very simple, and the Wayne softening apparatus occupies a comparatively small space.

Booklets dealing with the various uses and benefits of the Wayne Soft Water and the methods of application of the Wayne System are available to engineers and managers for the asking.

Wayne Sales Engineers will promptly supply detailed information in regard to the various sizes of installations, prices, operating costs, savings, etc.

Come and see us at the Power Show.

It Will Be a Pleasure to Give You Full Information Regarding Soft Water for Your Power Plant

Wayne Tank and Pump Company, 709 Canal Street, Fort Wayne, Indiana

Wayne Tank & Pump Co. of Canada, (Ltd.), Toronto, Ont., Canada
Wayne Tank & Pump Company, 9 Kingsway, London, W. C. 2, England

Division Offices in: Atlanta, Boston, Chicago, Cincinnati, Cleveland, Columbus, Dallas, Dayton, Des Moines, Detroit, Indianapolis, Jacksonville, Kansas City, Milwaukee, Minneapolis, New York, Omaha, Peoria, Philadelphia, Pittsburgh, San Francisco, St. Louis and South Bend

Warehouses in: Philadelphia and San Francisco

An International Organization with Sales and Service Offices Everywhere

REG. U.S. TRADE MARK

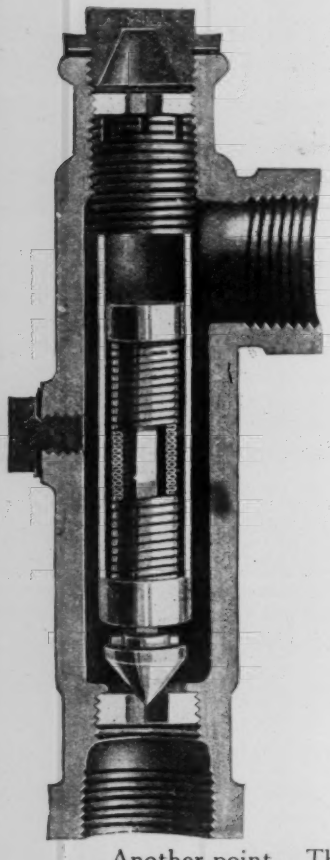
Wayne

RAPID RATE

Water Softeners

For Household and Industrial Purposes

Power Show BOOTH No. 30 Grand Central Palace - New York, N.Y. December 3rd to 8th



Save the Heat Units and You Save Steam-Fuel-Labor

High costs of both coal and the labor that shovels it, as well as labor shortage, make it doubly necessary to *save steam* if you wish to minimize waste, boost production and increase profits. These things can all be accomplished by the use of Sarco products.

STEAM TRAP SARCO

The low price of the Steam Trap Sarco (about one-third the cost of bucket and float traps) enables you to put in three Sarcos for the cost of just one of the other traps. Thus for the same expenditure you *save three times as much steam* and therefore three times as much coal, as well as the handling of same. Because of its low cost, the Sarco can be installed at *every point* where trapping is necessary.

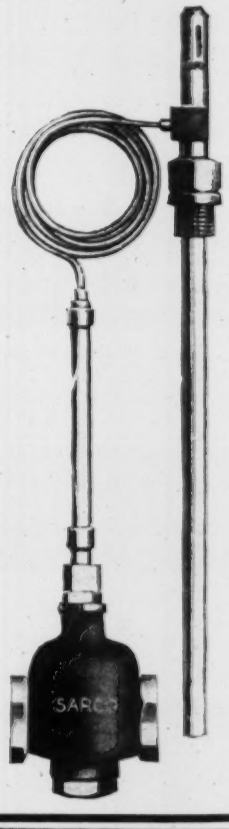
The Sarco closes promptly, positively preventing all loss of live steam. And it returns condensate to the hot well while still hot, consequently less fuel is required to again turn it into steam.

Another point. The Sarco has only five parts, against forty-three parts for some traps. Fewer parts to get out of order and require replacement—fewer parts to carry in stock.

A still further saving is effected due to the fact that the Sarco requires little more space than an elbow and screws right into the pipe line at any angle. No platform, pit nor supports needed.

Made in sizes 3/8" to 3" for any given pressure up to 200 lbs. Other advantages explained in booklet E-47, sent on request.

SARCO Temperature Regulator



Eliminates guesswork in temperature maintenance. It reduces fuel consumption by not permitting the maintenance of too high a temperature. Does away with spoiled goods by not allowing too much or too little heat to be used.

Cuts labor cost by enabling operators to do other more important work instead of watching and adjusting hand valves.

The Sarco Regulator is entirely self-contained. Requires no compressed air, electricity or other outside agencies to operate. Has no complicated mechanisms or delicate parts to get out of order. Operates on gas, steam or hot water heat.

No other self-contained regulator has such fine adjustment. It has no open or exposed diaphragms and the operation of the valve is gentle and controlled, instead of being sudden.

Can be supplied for any temperature from 30° to 300° F. to control temperature in most any kind of manufacturing process, as well as for room control.

Booklet E-86 contains interesting information. Write for it.

Any Sarco product sent on 30 days' free trial.

SARCO CO., INC.

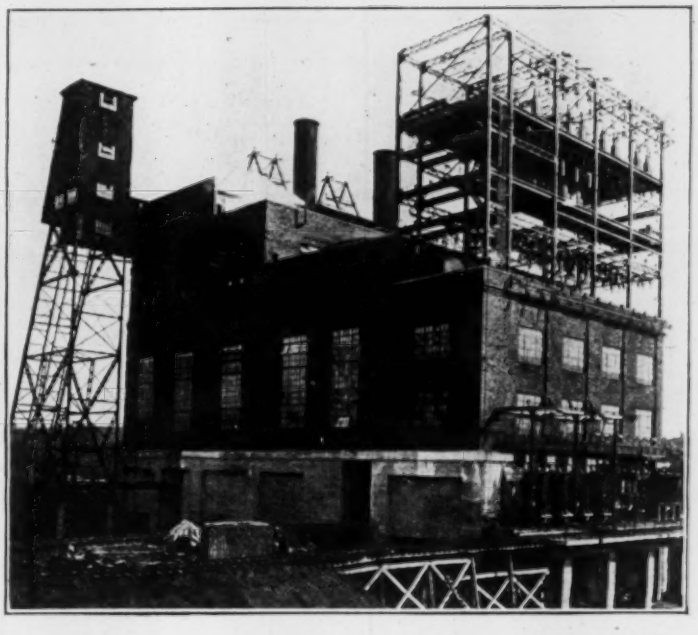
7 Barclay Street New York

Buffalo Boston Philadelphia Cleveland Chicago Detroit

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

Power Show BOOTH Nos. 23-24-25 Grand Central Palace - New York, N.Y. December 3rd to 8th

420% OF RATING



is a Daily Performance of the New Frederick Stoker

This Remarkable Performance Should Interest All Central Station Executives

At the Potomac Public Utilities Corporation, Williamsport, Maryland, one of the fourteen Retort New Frederick Stokers, Central Station Type, equipped with Clinker Grinders under a 1,450 H.P. boiler with economizer carries a station load of 13,000 K.W. To insure High Overloads and High Efficiencies, specify

The New Frederick Stoker

See this stoker on exhibit at the New York Power Show, Grand Central Palace, Booths 23-24-25.

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

INTERNATIONAL COMBUSTION ENGINEERING CORPORATION

Combustion Engineering Corporation

Combustion Engineering Bldg. — 43 Broad Street New York City

Offices in Principal Cities Throughout the World

Frederick Multiple Retort Stokers
Type E Stokers
Type D Stokers
Type K Stokers
Type H Stokers
Self Contained Stokers

Green Chain Grate Stokers
Green Cast Iron Hoppers
Green Pressure Waterbacks
Quinn Fuel Oil Equipment

Lopulco Pulverized Fuel System
Cox Stokers
Grieve Grates
Air Heaters
CEC Tube Scraping Device
Combusco Water Seal Conveyors

Power Show BOOTH No. 16 Grand Central Palace - New York, N.Y. December 3rd to 8th

1950 A Message From Mars

"EARTHLY CONTROL BY DEAN SYSTEM"

STATION LOAD INDICATORS

REMOTE WATER GAUGE

REMOTE VALVE CONTROL

SWITCHBOARD

CHIEF ENGINEER

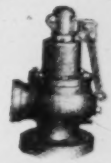
TURBINE AND BOILER ROOMS

PAYNE DEAN LIMITED

STAMFORD, CONN.

Power Show BOOTH No. 74 Grand Central Palace - New York, N.Y. December 3rd to 8th

S & B American Steam Gauge



American Pop-Safety Valve

Generating Power Efficiently and Economically

THROUGH the many phases of generating power by steam or water, what is more essential to efficient and economical production than reliable power plant instruments —Valves, Steam Traps, etc.?

The American Schaeffer & Budenberg line is complete and *reliable*. For it is backed by nearly 75 years of practical experience in serving and solving the problems of power generation.

Instruments for indicating, recording and controlling pressures, temperatures and speeds—instruments well known for their accuracy of function and ruggedness and perfection of mechanical construction.

Pop-Safety and Relief Valves of most modern design and of proven adaptability to most severe conditions. A Steam Trap of unusual merit and capacity.

Our Catalog Set N-24 is extremely interesting and instructive. A copy is yours for the asking.

American Schaeffer & Budenberg Corporation

Schaeffer & Budenberg Mfg Co.
American Steam Gauge & Valve

Brooklyn, N. Y.

*Boston	Cleveland	New Orleans
Buffalo	Detroit	Philadelphia
*Chicago	*Los Angeles	*Pittsburgh

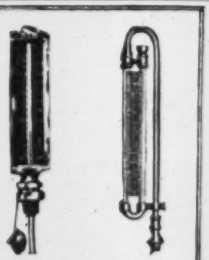
*Stock carried at these branches

S & B "Reform" Dial Thermometer

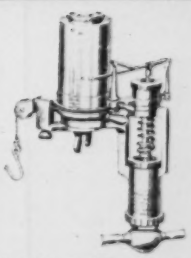
S & B Temperature Regulator

Columbia Recording Gauge

Columbia Recording Thermometer

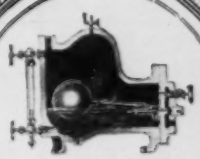


Crescent Thermometer U Gauge



American-Thompson Improved Indicator

Columbia Hand Tachometer



American Ideal Steam Trap

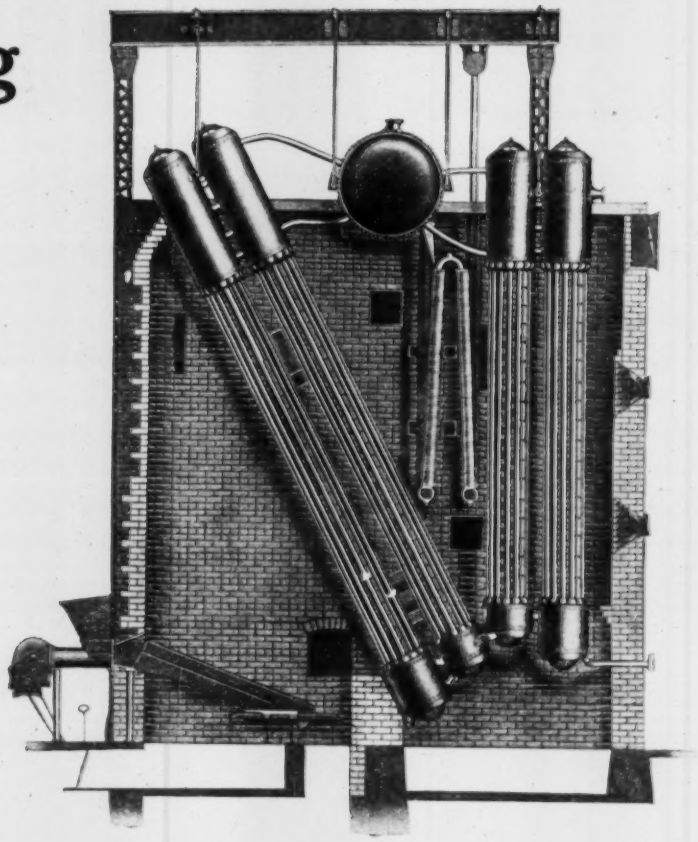
See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

Power Show BOOTH No. 68 Grand Central Palace - New York, N.Y. December 3rd to 8th

High Operating Efficiency—

Low Repair Cost—

Next to safety—these two features should be your first consideration in selecting the boilers that are most suitable for your plant.



Bigelow-Hornsby Water Tube Boilers

BOOTH No. 68

POWER SHOW

Grand Central Palace
New York

DECEMBER 3 to 8, 1923

A complete model of the Bigelow-Hornsby boiler will be on display, under actual working conditions, showing the circulation of water within the boiler and method of gas flow.

are notable for their excellence in economical steaming.

The scientific design provides for the maximum percentage of direct heating surface, extremely rapid circulation and free steam liberation.

Dry steam at all ratings and high flexibility in meeting all demands promptly are assured.

The gas flow is contrary to the circulation, so that the hottest gases meet the hottest water. The coolest gases are used to preheat the water entering the rear vertical tubes of the boilers. The construction affords ease of access for inspection, cleaning and tube renewals, when required. No tube hand-hole plates or stayed surfaces.

Furnished in units containing from 3750 to 55,000 sq. ft. of heating surface.

Write for illustrated Bigelow-Hornsby Catalog.

The Bigelow Company, 20 Lloyd St., New Haven, Conn.

Boston
141 Milk St.

New York
149 Broadway

Power Show BOOTH No. 44A Grand Central Palace - New York, N.Y. December 3rd to 8th

Increased Boiler Capacity—Constant Steam Pressure *With Cheap Fuel*

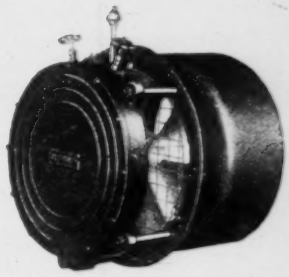
You can carry your heaviest peak load with the cheapest fuel available if you equip your boilers with

REGISTERED COPPUS U.S. PAT. OFFICE

TURBO-BLOWERS

If You Fire by Hand—

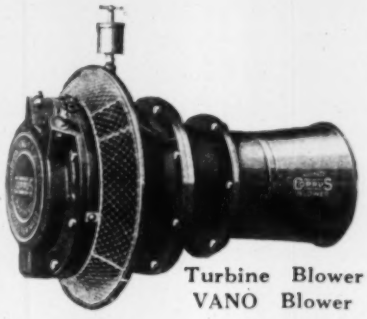
A COPPUS Type "C" Turbo Blower placed in boiler wall will result in a marked saving in fuel and insure higher steaming capacity and steady pressure. It occupies no floor space and is designed for continuous operation under boiler room conditions. Can be controlled automatically or by hand.



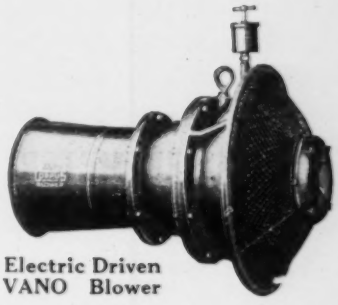
Type C Undergrate Blower

For Mechanical Stokers and Induced Draft—

we have developed the COPPUS VANO BLOWER with either turbine or motor drive.

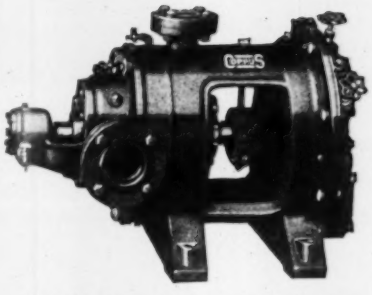


Turbine Blower VANO Blower



Electric Driven VANO Blower

The VANO is unquestionably the most efficient blower yet built. It combines the advantages of the centrifugal and propeller blower,—is more efficient than either and admirably adapted for direct motor or turbine drive. Be sure to investigate.

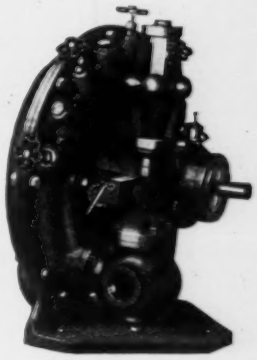


Type TB Coppus Centrifugal Boiler Feed Pumps, multi-stage—the latest development in the feed pump design. Adapted to service with the highest modern boiler pressures.

The Efficient Way To Pump Feed Water

The COPPUS Turbo Feed Pump was specially developed to bring the high efficiency and even feed pressure and other advantages, resulting from the use of centrifugal feed pumps, to the small and medium size plant.

Write us for full set of Coppus Bulletins. Consult us regarding your special requirements.



Type TC Coppus Steam Turbine Two row velocity stage impulse type up to 50 Brake HP.

Coppus Engineering Corp., 342-46 Park Ave., Worcester, Mass.

Power Show BOOTH No. 41 Grand Central Palace - New York, N.Y. December 3rd to 8th

STOKER REPLACEMENTS
STOKER ACCESSORIES

WE SPECIALIZE IN
FURNACE
ENGINEERING
THAT GIVES
MAXIMUM
BOILER EFFICIENCY

GRATE SURFACES
TUYERES
STOKER METERS
STOKER AGITATORS

FURNACE WALLS
FURNACE WALL SUPPORTS
FURNACE BLOCKS

PULVERIZED FUEL EQUIPMENT
Pulverized Fuel Burners
Pulverized Fuel Unit Systems

Our policy and practice is to improve the vital parts of Mechanical Stokers and general Furnace Design and to give our clients unbiased, common sense engineering. This service is backed by our organization of engineers who are reputable specialists.

Consult us on your Boiler Room Problems.
Write to us or to our nearest branch.

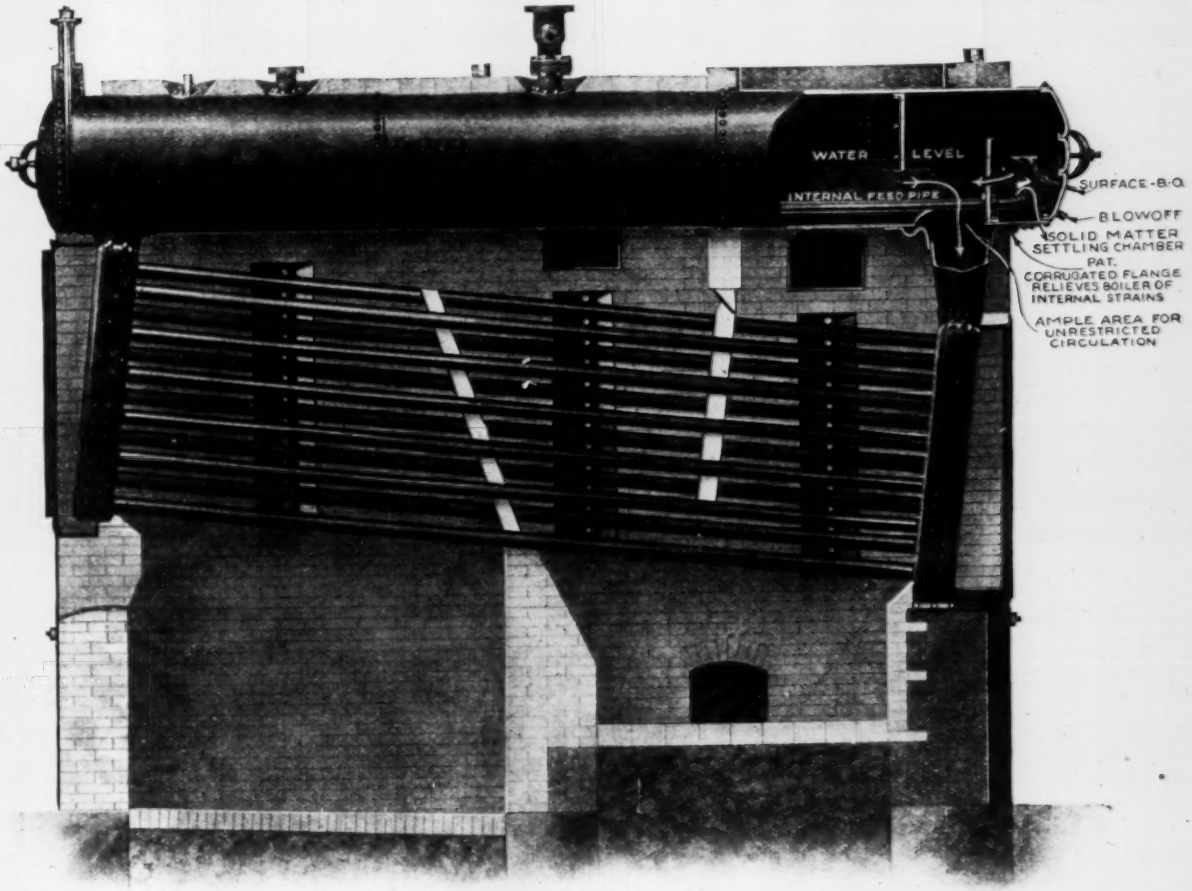
FURNACE ENGINEERING COMPANY, INC.

5 Beekman Street **New York, N. Y.**

Branch Service and Sales Offices

BOSTON PHILADELPHIA PITTSBURGH MONTREAL CLEVELAND CHICAGO DETROIT

Power Show BOOTH No. 95A Grand Central Palace - New York, N.Y. December 3rd to 8th



UNION WATER TUBE BOILERS

Decidedly Better—For these Reasons

The circulation is faster and more positive—because the wide area headers and connections offer no restrictions to the flow, and the tubes are inclined at an unusually steep angle.

The heating surfaces stay clean, even with bad water, for a considerably longer time—because the feed water must pass through a purifier and settling chamber located in the rear of each drum, where it is out of the path of the fire.

Easier to clean—because the tubes have pear-shaped steel hand hole plates, that are quickly removed and replaced. Vertical staggering of the tubes gives better access for removal of soot.

Scientifically baffled to insure the most efficient gas velocities.

Minimized internal stresses—because the rear header is connected to the drums by means of a flexible corrugated flange.

Headers are made up in integral halves in one heat and thoroughly reinforced by staybolts arranged with a regular pitch. No rivets or double plates are exposed to the fire.

The double drums and the wide area headers give ample water and steam storage space for large overload capacity.

Exceptional care in selecting materials and the best in workmanship insure the highest quality construction that can be put into a boiler.

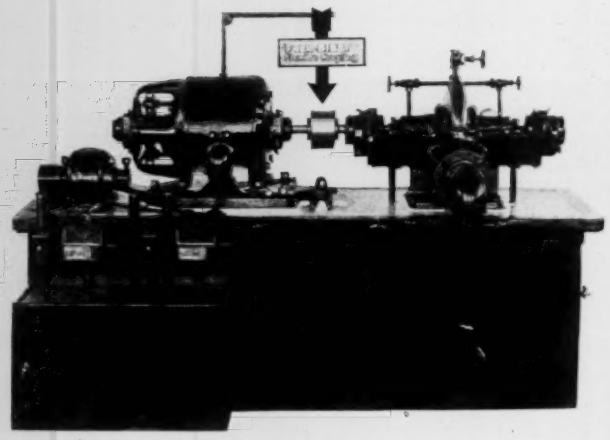
Built in a modern shop at Erie, Pa., located on the main line with unexcelled shipping facilities.

Illustrated Catalog mailed on request. Write for your copy.

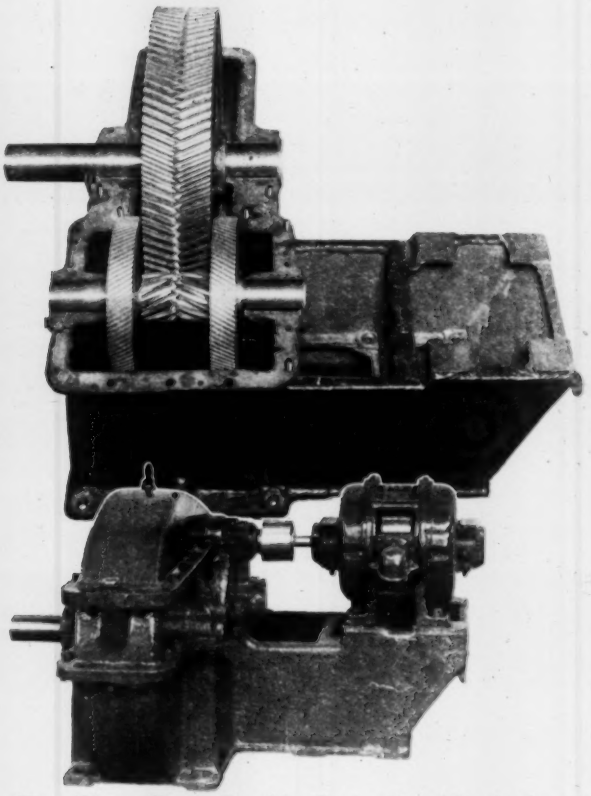
UNION IRON WORKS, ESTABLISHED 1889 **Erie, U. S. A.**

We also make horizontal return tubular boilers and do steel plate work.

Power Show BOOTH No. 339 Grand Central Palace - New York, N.Y. December 3rd to 8th



This interesting demonstration which will be shown at the Power Show in New York, discloses the fact that the Falk-Bibby Coupling has extraordinary capacity for angular misalignment. It consists of a single stage centrifugal pump to provide load with a number 4.5 Falk-Bibby Coupling attached to a motor which is set on a sliding base pivoted at the front and rear ends. This allows for continuous movement from side to side through a total angle of 6 degrees with the aid of a small auxiliary motor, worm gear and adjustable crank. This shows conclusively that the coupling can accomodate an actual misalignment of 3 degrees.



Two Plane Type Double Reduction Herringbone Gear Unit to be exhibited at the Power Show—Ratios 40 to 50 to 1—5 H.P.—1150 to 23 r.p.m. Designed for Saw Mill work.

Falk-Bibby Flexible Couplings now mean in the alignment of shafting what Falk Herringbone Gears have long meant in transmitting power.

The placing of this coupling—(which has both torsional and lateral elasticity and which remains truly flexible under normal and light loads and will stand far greater overloads than any other type)—on the American Market is a notable step in the consummation of a complete Falk Service for the smoothest and most efficient distribution of power which can be attained.

Do not fail to visit us in Booth 339.

THE FALK CORPORATION

Milwaukee Wisconsin

REPRESENTATIVES:

W. O. Beyer, 1007 Park Bldg., Pittsburgh, Pa.

Mine & Smelter Supply Co., Denver, El Paso and Salt Lake City.

M. P. Fillingham, 50 Church St., New York City.

Engineering Equipment Co., Ltd., 358 Beaver Hall Square, Montreal, Quebec, Canada.

Vulcan Iron Works, Wilkes-Barre, Pa.

General Machinery Co., Brown Marx Bldg., Birmingham, Ala.

FOREIGN REPRESENTATIVES: Gustav Melms, 3 Rue Taitbout, Paris.

FALK

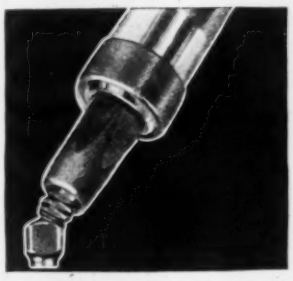
Power Show BOOTH No. 236 Grand Central Palace - New York, N.Y. December 3rd to 8th

The Dot Lubricator is thoroughly protected by allowed claims of pending patent applications.

"The Finest Thing We Have Seen"

—writes the Works Manager of the Independent Pneumatic Tool Co., Aurora, Ill. Innumerable letters from enthusiastic users of the DOT give concrete evidence of the successs of the DOT System for lubricating industrial machinery.

Lubricating and maintenance costs have been lowered, frozen bearings, break-downs and costly delays have been avoided and depreciation of machinery has been considerably reduced by the installation and use of the DOT High Pressure System. Manufacturers who are proud of the machinery they make will see immediately how standard adoption of the DOT wins prestige and good will for their firms and enhances the value of their products.



ABOVE—Showing Solid, direct connection of nozzle to steel, one-piece nipple. Nozzle locks tight on nipple, forming a leak-proof seal. The greater the pressure the tighter the seal.

Used as Standard Equipment by More Than 100 Leading Industries in America

Why the "DOT" Succeeds Where Others Fail

In the above letter the writer says—"A new kind of saturated slow-flowing mineral oil works very nicely with the Dot." That is one of the exclusive features of the Dot. The automatic valve and solid leak-proof connection of nozzle and nipple enables it to handle oil as well as grease or kerosene for flushing frozen bearings. *With a progressive pressure from 1 to 3000 pounds,* it forces out gritty, gummed-up grease, replacing it with good, clean lubricant. Operated entirely with one hand, it is clean, convenient and *safe* to handle. The oiler can stand well away from pulleys, belts, gears, and other danger spots and still reach each lubricating point with perfect ease. For very remote parts, such as between two closely-located machines or bearings located beyond ordinary reach "extension arms" are provided.

The Dot "Knapsack" carrier and gun for lubricating a large number of machines, pulleys, etc.

An interview may mean large savings to you in the elimination of costly lubricating difficulties.

MADE ONLY BY

CARR FASTENER COMPANY 31 AMES STREET Cambridge, Mass.

"Makers of the DOT Line of Fasteners"

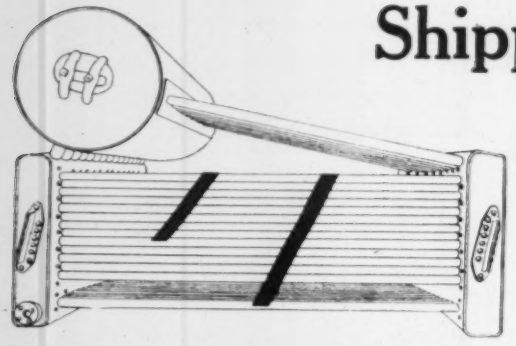
BRANCHES:

40 Seldon Ave. Detroit — 47 W. 34th St., New York City — Monadnock Bldg., San Francisco — Gage Ave. & Beach Road Hamilton, Ont., Canada

Be Sure to Visit Booth No. 236 when at the Power Show

·DOT *high pressure* LUBRICATOR

Power Show BOOTH No. 95 Grand Central Palace - New York, N.Y. December 3rd to 8th



Shipped Completely Baffled

WITH

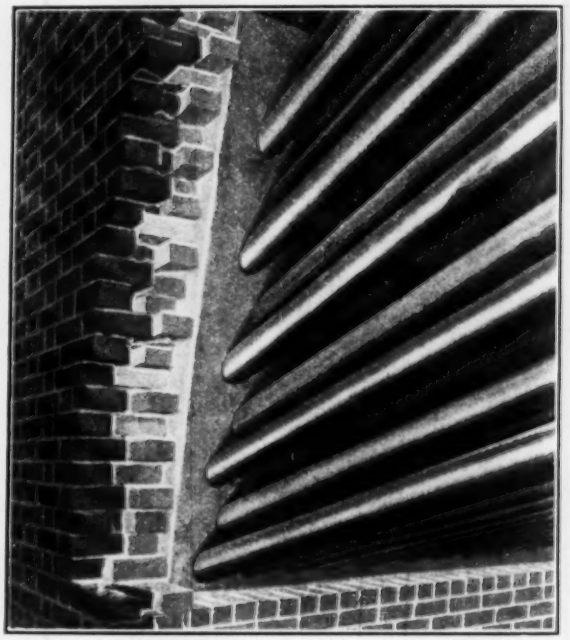
"MONO" TRADE MARK Boiler Baffles

The illustration shows one of twelve Heine Cross-Drum Boilers fitted with **"Mono"** baffles built in their shop and shipped by rail as complete units to Staten Island for installation on board the new municipal ferry-boats in New York Harbor.

"MONO" BAFFLES WITHSTAND VIBRATION

and are the most economical to install because of their long, lasting qualities. **"Hugs the Tubes"** and permits any tube to be withdrawn and replaced without injury to the baffles.

We guarantee **"Mono" Baffles** to withstand the use of an air driven turbine cleaner, the shock, vibration and other abuse of handling.



The illustration above shows a first-pass "Mono" baffle as seen through an opening in the side wall, looking toward the rear of the boiler. Note the absolutely monolithic construction—the close fit around tubes and against the walls—and the entire freedom from any possibility of leakage.

OUR MANY SATISFIED CUSTOMERS PROVE THESE STATEMENTS

"Mono" Baffles are installed by us or **You can Build Them with "Mono" Cement** following our instructions.

Our engineers are ready to serve you.

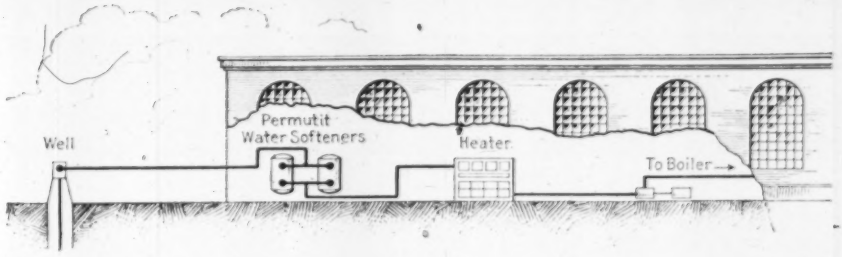
Write for Bulletin M

KING REFRACTORIES CO., Inc.

BUFFALO, N. Y.

Boston New York City Philadelphia Chicago
Pittsburgh Cleveland Cincinnati Detroit
Toronto, Canada, Grant E. Cole Co.

Power Show BOOTH No. 3 Grand Central Palace - New York, N.Y. December 3rd to 8th



How a New Jersey Engineer Keeps his Boilers free from Scale

The Chief Engineer of a water supply company in New Jersey operates a boiler plant consisting of 1 Erie, and 2 Babcock and Wilcox water tube boilers, totalling 435 H.P. The feed water, as obtained from their well, contains only 6 grains of hardness per gallon, but nevertheless, the Chief Engineer writes that he formerly had "endless trouble with scale." He tried boiler compounds of all sorts, but was not successful in preventing scale or relieving the constant, difficult cleaning it causes.

Previous to 1916 he had only one Erie boiler, of the three boilers mentioned above. He thoroughly investigated scale prevention and was so convinced he was on the right track that when the two new B & W boilers went in, he also installed a Permutit Water Softener to remove all scale-forming impurities from the total feed water of 24,000 gallons per 24 hours.

Starting with 2 new boilers, he had an excellent chance to observe the work of the Softener. And this is what he writes:

January 18th, 1923.

"Before installing our Permutit Water Softener (in December 1916), we had endless trouble with boiler scale. At that time, we installed two Babcock boilers. Up to the present time, the Babcock boilers are ***as clean as the day they were installed.*** * * * We have used a number of boiler compounds, but find your Softener is the only treatment that has given satisfaction. We consider this method of water softening 100% perfect."

(Copy of this letter and name of Company gladly furnished upon request.)

After six years, his boilers are as clean as the day they were installed. Think what it would mean to you to have your boilers ***stay*** clean—and we can solve your problem equally well.

This Chief Engineer got his original suggestions from our booklet, "Reducing Fuel and Boiler Plant Operating Costs," which contains a clear explanation of the causes of scale and how to prevent it, as well as first-hand data which we have collected from engineers in the hundreds of plants we have served.

You will find it very interesting and instructive—just mail the attached coupon today for a copy.

The Permutit Company
440 Fourth Ave. New York

For Your Protection

On June 15, 1921, the Federal Court at Buffalo (Hazel, J.) handed down a decision sustaining our patent covering zeolite water softening apparatus, and stating that this patent "is concededly not limited to any particular class of zeoltic material." The Court also described the apparatus held to infringe, and this description, our counsel advises, applies to all zeolite softeners on the market. Other suits brought by us for infringement are pending.

The above decision has been affirmed by the Circuit Court of Appeals, and the U. S. Supreme Court has denied a petition for a writ of Certiorari to review it.

Send for this free booklet

The Permutit Company
440 Fourth Ave.
New York

Please send me your free booklet, "Reducing Fuel and Boiler Plant Operating Costs."

Name .....

Address .....

Company .....

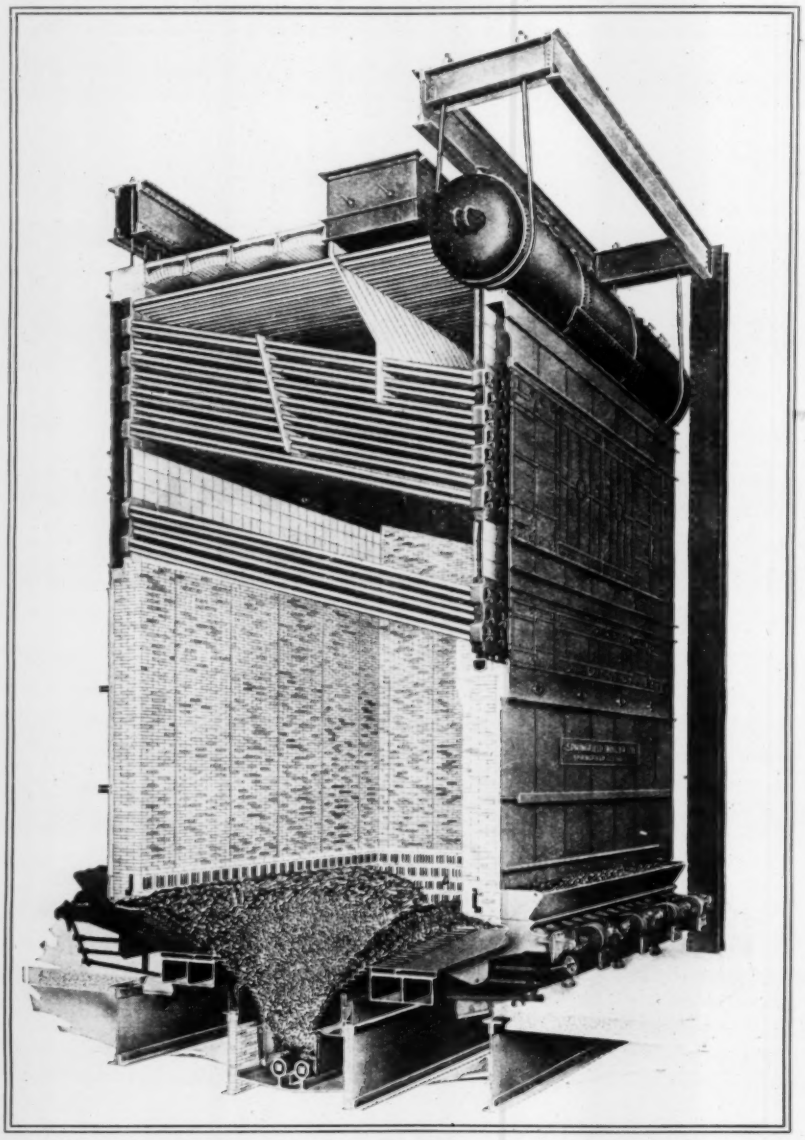
See Our Data in 1923-24 A.S.M.E. CONDENSED CATALOGUES of MECHANICAL EQUIPMENT

2028-31

Power Show BOOTH No. 31 Grand Central Palace - New York, N.Y. December 3rd to 8th

SPRINGFIELD BOILERS
IN THE HELL GATE STATION
of the United Electric Light & Power Co., New York City

SECTIONAL
ALL STEEL



NO STAY BOLTS
NO BENT TUBES

In 1920—The United Electric Light & Power Co.—purchased and installed 12—1890 H.P. Springfield Boilers for their new Hell Gate station.

Three additional Springfield Boilers are now being installed in the Hell Gate Station and six in the Sherman Creek Station of the above Company.

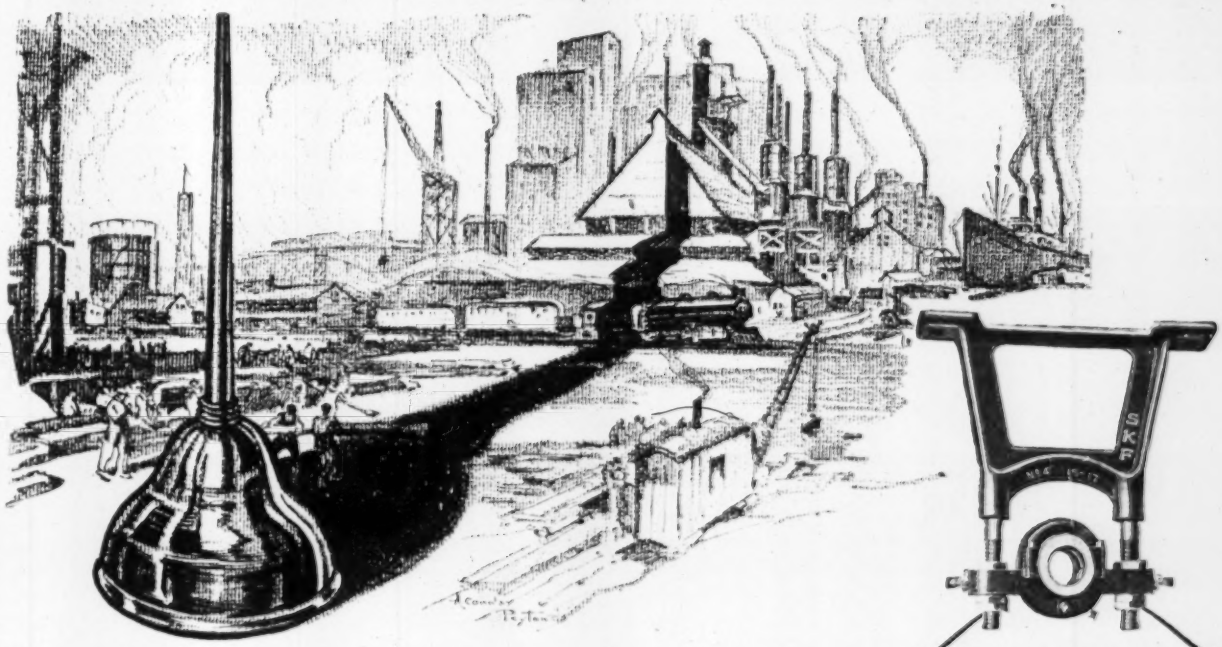
Large Power users and leading Engineers purchase Springfield boilers *again and again.*

SPRINGFIELD BOILER CO.
SPRINGFIELD, ILL.

OFFICES:

Chicago	Detroit
Boston	Buffalo
New York	Duluth
Philadelphia	Minneapolis
Pittsburgh	Atlanta
Richmond	Kansas City
Cleveland	Denver
Cincinnati	San Francisco

Power Show BOOTH Nos. 332-333 Grand Central Palace - New York, N.Y. December 3rd to 8th



Is the shadow of the oil can on your plant?

ARE you dependent upon the oil can and the handy man to keep your plant going—to prevent hot bearings and other troubles which curtail production and eat into your profits?

Remove the shadow of the oil can from your plant by installing Skayef self-aligning ball-bearing hangers which will not bind and heat. Lubricant and maintenance charges will be reduced 60 to 80 per cent and you can release the handy man for more profitable work. A little lubricant once every three or four months is all the attention this type of hanger requires.

Others have found that ball-bearing equipment pays for itself in two years and often in a shorter period. Let an **SKF** engineer estimate what you will save.

1366 *For Nearest Distributor See McRae's Blue Book.*

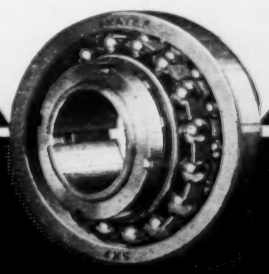
SKAYEF
—the 4-Saving Hanger

1st Saving Skayef Hangers save from 50 per cent upward of the energy which plain bearings consume in friction. This means a saving of 15 to 35 per cent of your power cost.

2nd Saving Considerable time is saved by eliminating shutdowns for replacing or adjusting bearings; forced idleness of machines and men is a cost-factor too big to be ignored.

3rd Saving Lubricant consumption reduced 60 to 80 per cent as compared with plain bearing hangers. Lubricant required only at infrequent intervals and it cannot leak out and ruin belts or product.

4th Saving There is no discernible wear of the hard steel balls and races and absolutely no shaft wear. Dust and grit cannot enter the bearings and Skayef self aligning ball-bearings have the exclusive inherent ability of compensating automatically for shaft deflections.

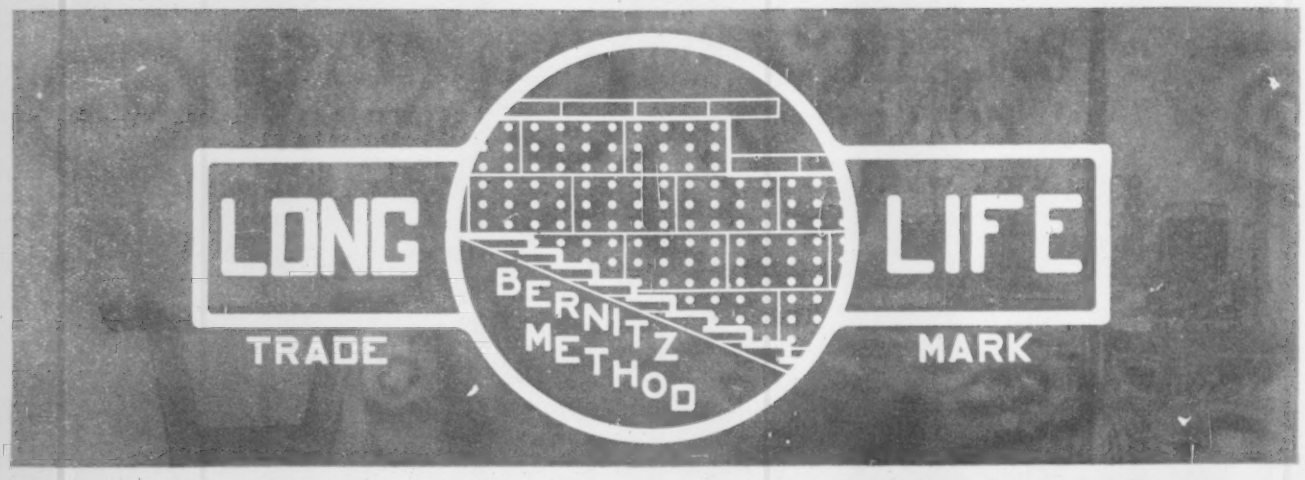


SKAYEF
Self-Aligning Ball-Bearing HANGERS

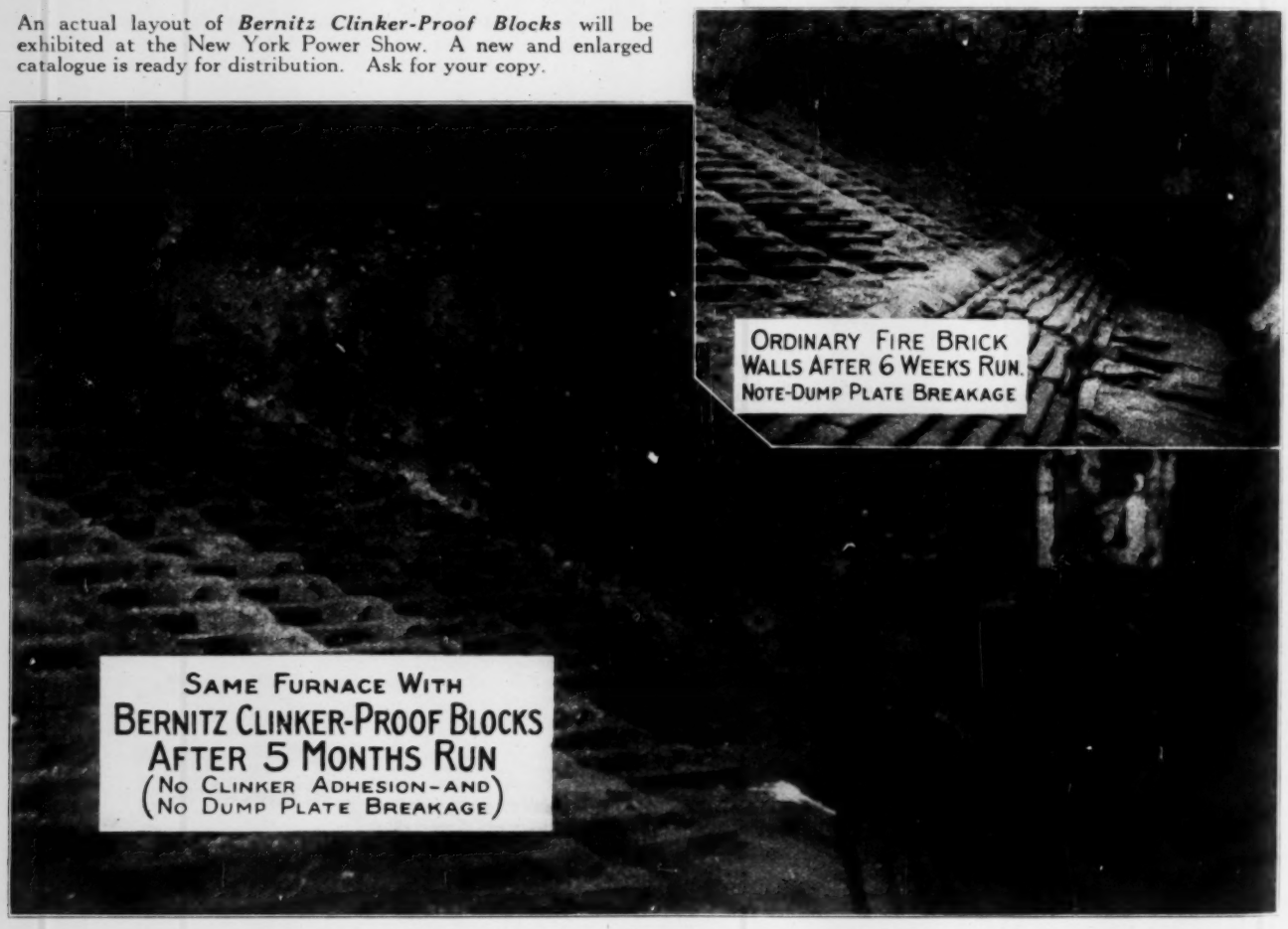
Made Under SKF *Supervision*

THE SKAYEF BALL BEARING COMPANY - - - - 165 Broadway, New York City

Power Show BOOTH No. 78 Grand Central Palace - New York, N.Y. December 3rd to 8th



An actual layout of ***Bernitz Clinker-Proof Blocks*** will be exhibited at the New York Power Show. A new and enlarged catalogue is ready for distribution. Ask for your copy.



ELIMINATE FREQUENT SHUTDOWNS OF BOILERS

together with stoker breakage, arduous labor, costly setting maintenance, and associated troubles that are caused by clinkers adhering to your furnace walls.

The story shown by the above photos is why ***Bernitz Clinker-Proof Blocks*** are specified and used in many leading central stations and industrial power plants. See list of representative users in our catalogue.

Bernitz Blocks are readily installed in existing as well as new furnaces. Our Super Blocks, which are described in separate bulletin, are particularly adapted to chain grate furnaces.

N. Y. Office
350 Madison Ave.
New York City

BERNITZ FURNACE APPLIANCE CO.

Main Office
177 State St.
Boston, Mass.

Philadelphia Pittsburgh Cleveland Chicago Detroit Birmingham St. Louis

Power Show BOOTH No. 48 Grand Central Palace - New York, N.Y. December 3rd to 8th

READING CAST STEEL FLANGES and FITTINGS

Working Pressure Classifications

Extra Heavy Cast Steel Flanged Fittings for 350 lbs. working pressure at 800° F.

Class B

Steam or oil up to 150 pounds pressure and temperatures up to 800° Fahrenheit. Cold water or oil up to 300 pounds pressure.

Class F

Steam or oil up to 250 pounds pressure and temperatures up to 800° Fahrenheit. Cold water or oil up to 500 pounds pressure.

Class H

Steam or oil up to 350 pounds pressure and temperatures up to 800° Fahrenheit. Cold water or oil up to 700 pounds pressure.

Class L

Steam or oil up to 500 pounds pressure and temperatures up to 800° Fahrenheit. Cold water or oil up to 1000 pounds pressure.

Class N

Steam or oil up to 750 pounds pressure and temperatures up to 800° Fahrenheit. Cold water or oil up to 1500 pounds pressure.

Class T

Steam or oil up to 1500 pounds pressure and temperatures up to 800° Fahrenheit. Cold water or oil up to 3000 pounds pressure.

Hydraulic Cast Steel Flanged Fittings for the higher steam pressures.

Standard Cast Steel Flanged Fittings for 250 lbs. working pressure at 800° F.

Screwed Cast Steel Fittings for all pressures and temperatures up to 800° F.

READING STEEL CASTING COMPANY

INCORPORATED

Reading Valve & Fittings Division

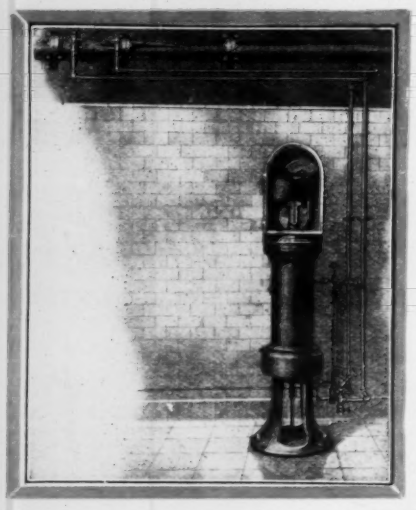
An Associate Company of the American Chain Company, Incorporated

929 Connecticut Ave. Bridgeport, Conn.

Boston, Charlotte, Chicago, Cleveland, Detroit, Hartford, Houston, New York, Philadelphia, Pittsburgh, San Francisco, St. Paul, Rochester

Power Show BOOTH No. 210 Grand Central Palace - New York, N.Y. December 3rd to 8th

Relative Advantages of Boiler Feed and Steam Meters for Power Plants



The ideal design provides both the boiler feed meter and a steam flow meter. If on account of economy, only one meter is used, then the boiler feed meter is by far the most essential, as it measures the entire charge against the fuel consumed, including steam for engines and auxiliaries, water heated and discharged through the blow off mains, leakage and waste from water columns and through pop safety valves, steam used for tube cleaners, water used for cleaning boilers and steam for regulators.

On the other hand the steam flow meter accounts for only the steam supplied to engines and auxiliaries.

Water meters are also more accurate than steam meters, which is another reason why they are preferred.

The Simplex Boiler Feed Meter

Indicates, Records and Totalizes the entire amount of water fed to the boilers. By weighing the coal and dividing the water delivered by the coal burned the true story of Plant Efficiency may be obtained.

We would be glad to explain how Colfax, River Rouge, Hartford Electric Light Company, and many others are learning their true Plant Efficiency with Simplex Boiler Feed Meters.

"Simplex Installations Give Satisfaction."

SIMPLEX VALVE & METER CO., 5721 Race Street, PHILADELPHIA, PA.

Boston, Mass., Geo. W. Stetson, 141 Milk St.
New York City, W. K. Sowdon, 280 Madison Ave.
Pittsburgh, Pa., John D. Hiles, Oliver Building
Chicago, Ill., A. F. Barron, Room 1510 30 North Michigan Boulevard
San Francisco and Los Angeles, Cal., Water Works Supply Co.
Canada, Francis Hankin & Co., Montreal and Toronto, Ont.
Kansas City, Mo., C. T. McFarland, 307 Mutual Building
Cleveland, O., A. MacLachlan, Kirby Bldg.
Milwaukee, Wis., Fred H. Dorner
Salt Lake City, D. C. Dunbar Co.
Atlanta, Ga., W. J. Neville, Chandler Bldg.

Power Show BOOTH No. 248 Grand Central Palace - New York, N.Y. December 3rd to 8th

Builders of Boilers for over 38 Years

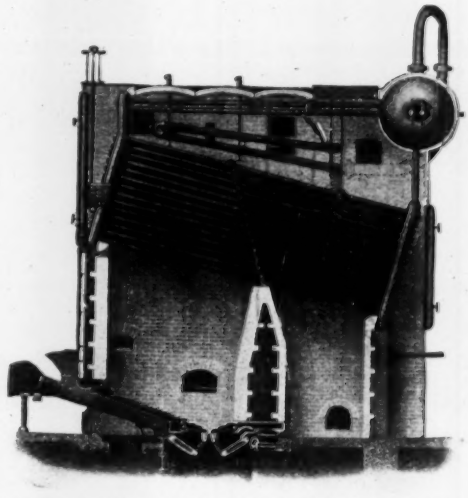
The Walsh & Weidner Boiler Co. has one of the largest and most modern equipped shops in the United States. Our plant is unexcelled in equipment and includes some of the largest machines. Our large bending rolls can bend plates 27'-0" wide. All other machines are in proportion.

Our Water Tube Boiler business is increasing fast. We are getting many repeat orders as well as new customers which is real evidence that our boilers are giving satisfactory results.

A few superior features in the Walsh & Weidner boilers are:

Special Inclined Baffle which will last longer than any other type in common use.
Special Mud pans and Baffles.
Return drain Dry pipes.
Our method of Supporting the Decks over the Circulating Tubes.

We have an up-to-date Engineering Department willing to consult with you without obligation on your part. Write for our latest bulletin.



Walsh & Weidner Cross Drum Water Tube Boiler Working Pressures Up To 375 lbs.

The Walsh & Weidner Boiler Co., Chattanooga, Tenn.

New York Jacksonville New Orleans Houston Memphis Kansas City San Francisco Havana Shanghai, China

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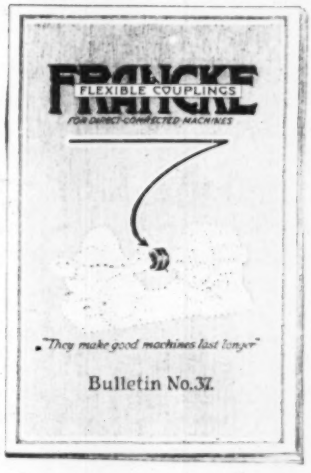

Get your copy of this new Francke catalog

If you can't see the five types of Franckes at the Show, send for your copy of this new catalog. It tells how each type should be used on direct-connected machinery—the most efficient and trouble-proof drive.

Eleven years' specialized coupling engineering experience has been reduced to print, pictures, and data in this new catalog.

Better send for your copy

SMITH & SERRELL
Coupling Specialists Since 1912
41 Central Ave., Newark, N. J.

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Worthington Pump & Machine Corp'n, Cudahay, Wis.

CRESSON-MORRIS COMPANY
Engineers, Founders, Machinists
Philadelphia, Pa.

September 25, 1923

Bradley Washfountain Company,
Milwaukee, Wisconsin.

Dear Sirs: Replying to yours of the 20th inst., our installation of Bradley washfountains is working very satisfactorily. Our men seem to like them very much. These fountains are installed in our foundry, where conditions, as far as dirt is concerned, are not the best, and also where there are a comparatively large number of the more ignorant class employed. We have noticed that with this washfountain installation more of this class of help are inclined to wash than previously. The higher class of our workers in the foundry think very highly of the washfountain.

We hope in the near future to duplicate this installation in our machine shops.

Very truly yours,
CRESSON-MORRIS COMPANY,
B. H. Johnson, Works Manager.

The Bradley Washfountain

Saves water, saves space, lessens repair and up-keep costs and facilitates quick "wash-ups" in clear running showers. Mixing device for hot and cold water conveniently located.

Factories are rapidly replacing old style fixtures with Bradley Washfountains.. Among recent orders are the following:

60 Fountains—Victor Talking Machine Co., Camden, N. J.
40 Fountains—Pennsylvania R. R. Co., Altoona, Pa.
30 Fountains—C. B. & Q. Ry. Co., Denver, Colo.
38 Fountains—Edw. G. Budd Co., Philadelphia, Pa., and others

Two Sizes—54 in. and 32 in. for 10 or 6 people. Write for Catalog.

BRADLEY WASHFOUNTAIN CO., Milwaukee, Wis.

Shown in operation at Booth 247

2nd National Exhibition
Power & Mech. Engineering

Fellinger & Hebard, Inc.
40 Rector St., New York
in charge of Exhibit

Power Show BOOTH No. 80 Grand Central Palace - New York, N.Y. December 3rd to 8th

At Your Service!

THE
A.S.M.E.
BOOTH
No. 80

Second
National
Exposition
of
Power and
Mechanical
Engineering

Grand Central Palace
New York, N. Y.
December 3rd to 8th

YOU are cordially invited to visit the A.S.M.E. Booth, Number 80, and make it your headquarters during the Power Show.

Mail addressed to the booth will be held until your arrival.

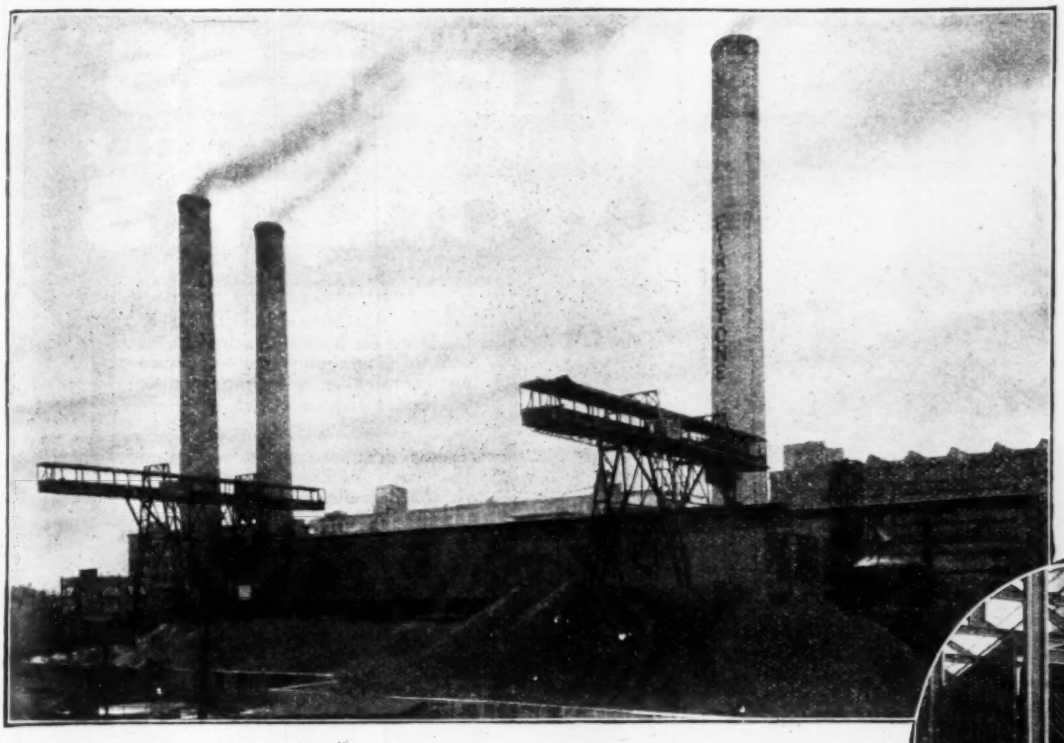
Appointments can be made to meet your friends at the booth.

Information can be had about the exposition, A.S.M.E. Annual Meeting which is being held at the same time, New York City and vicinity.

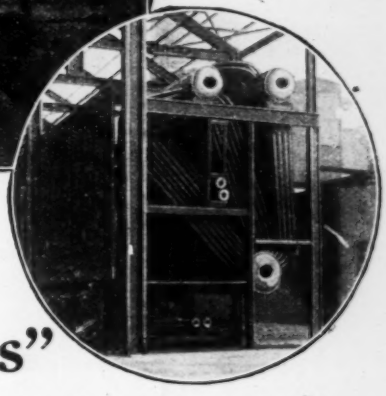
Applications can be filed at the booth for membership in the Society.

Publications of the Society will be on exhibition.

American Society of Mechanical Engineers
29 West 39th Street, New York, N. Y.



Power plant of Firestone Tire & Rubber Co., Akron, Ohio, operating four 1107 H. P. Connelly water tube boilers.



"Particularly Successful Under High Overload Conditions"

THE power generating equipment for manufacturing plants whose variable production conditions sometimes require its operation far above rated capacity must be selected with special care.

Thus the provision for delivering dry steam at high overload capacity furnished by the special design of Connelly (patented) water tube boilers naturally appealed to the builders of tires designed to give "most miles per dollar."

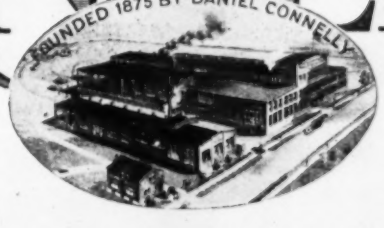
Since the installation of four 1107 H.P. Connelly boilers, Firestone has had no difficulty in getting 250% of rating and has even obtained a higher percentage on occasion, though their stack draft is not sufficient to operate above that point on balanced draft.

As Connelly boilers are built in units of from 200 to 3000 H. P. and for steam pressures up to 350 lbs., this economical equipment is equally serviceable for either large or small requirements.

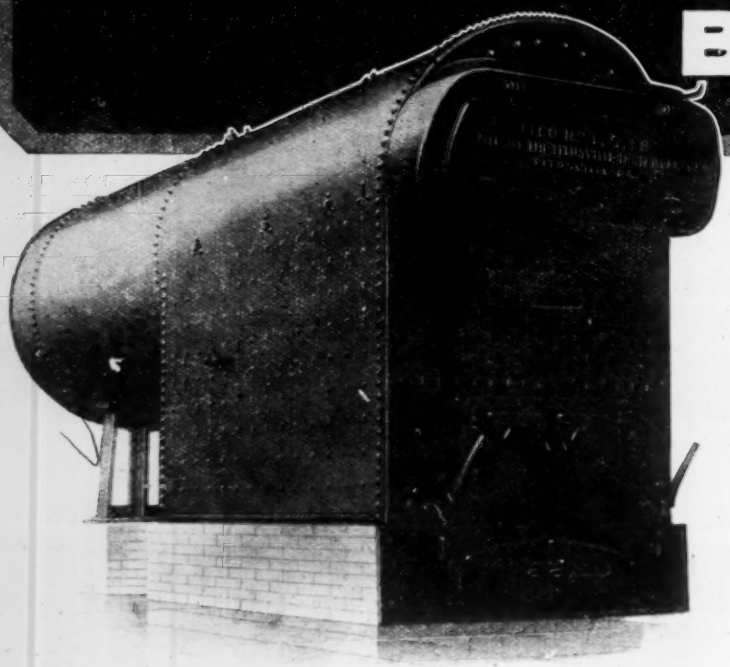
A fully explanatory catalog will gladly be sent at your request

The CONNELLY BOILER COMPANY

1170 Ivanhoe Rd. Cleveland Ohio



"TICO SMOKELESS"
DOWNDRAFT RETURN TUBULAR PORTABLE BOILERS



Designed for burning anthracite as well as bituminous coal—a feature not obtainable with any other Smokeless Firebox Boiler.

Constructed entirely of steel and in strict accordance with the A.S.M.E. Boiler Code—thoroughly inspected during construction and approved by an authorized inspector before shipment.

Do you have our bulletin on Smokeless Boilers?

TITUSVILLE IRON W'KS CO.
TITUSVILLE, PENNA.

Sales Offices:
NEW YORK 152 W. 42nd St. — BUFFALO Marine Trust Bldg.
DETROIT Peter Smith Bldg. — WASHINGTON Woodward Bldg.
PITTSBURGH Farmers Bank Bldg. — CHICAGO 53 W. Jackson Blvd.

Wickes Vertical Water Tube Boiler

TRADE-MARK

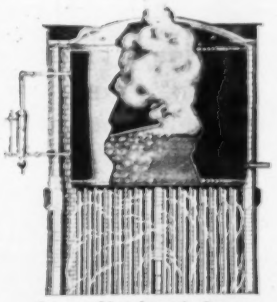
To prevent the wrecking of engines, and the clogging of blades and nozzles in steam turbines dry steam must be had. The WICKES boiler delivers dry steam.

Ask for Bulletins "Saving Coal in Steam Power Plants" and "The Steam Boiler Analyst"

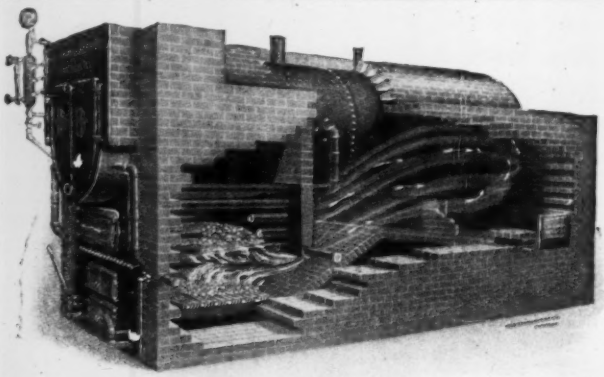
THE WICKES BOILER CO.
SAGINAW MICHIGAN, U. S. A.

SALES OFFICES
New York, 501 Fifth Ave. — Pittsburgh, 1218 Empire Bldg.
Chicago, 76 West Monroe St. — Detroit, 1116 Penobscot Bldg.
Seattle, 736 Henry Bldg.

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment



Great Height of Steam Room Insures Dry Steam



Herbert Smokeless Boilers

Down Draft **Detachable Firebox**

An absolutely smokeless boiler that is guaranteed to consume 95% of smoke from any grade of mine coal and to increase the boiler capacity from 5 to 25 h. p., depending on size.

HERBERT BOILER CO., Chicago

New York City, St. Louis, Mo., Minneapolis, Minn., Atlanta, Ga.
Omaha, Neb., Milwaukee, Wis., Seattle, Wash., Denver, Colo.
Salt Lake City, Utah, Oklahoma City, Okla., Wichita, Kan.
Spokane, Wash., Montreal, Canada, Toronto, Canada

See Our Exhibit
at the
POWER SHOW
December 3rd to 8th
Grand Central Palace
New York

THE GEORGE T. LADD COMPANY
Manufacturers of LADD WATER TUBE BOILERS
First National Bank Building, Pittsburgh, Penna.
Chicago Office McCORMICK BLDG. Philadelphia Office Franklin Bank Bldg. New York Office 18 Warren St.

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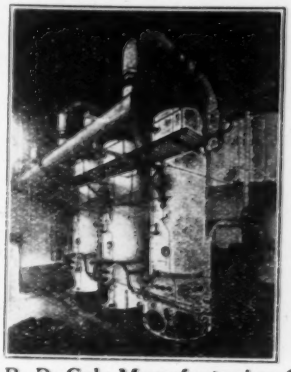
Cole-Manning Vertical Fire-Tube Boilers

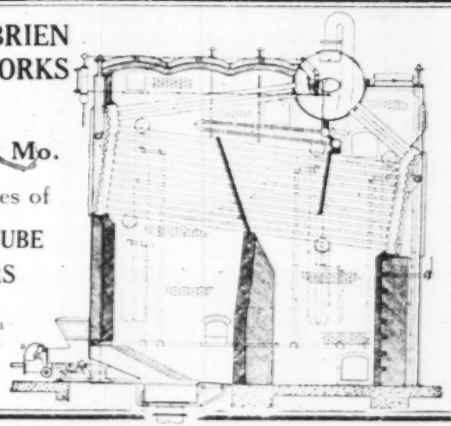


This type of boiler is constructed in units up to 400 horse-power and for pressure of 200 lbs. or more. Boiler shell is supported on a one-piece cast iron base which can be fitted with stationary or shaking grates. Smoke box is provided with removable cast iron cover and connections for all standard soot-cleaning devices. The evaporative performance, super-heating qualities and small floor space per horse power combine to make a most desirable and economical unit.

Further information regarding Cole Boilers, Tanks, Plate Work, etc., will be found on page 52 of the 1923-24 volume, A.S.M.E. Condensed Catalogues.

R. D. Cole Manufacturing Co. Newnan, Ga.

JOHN O'BRIEN BOILER WORKS CO.
St. Louis, Mo.
Four Types of
WATER TUBE BOILERS



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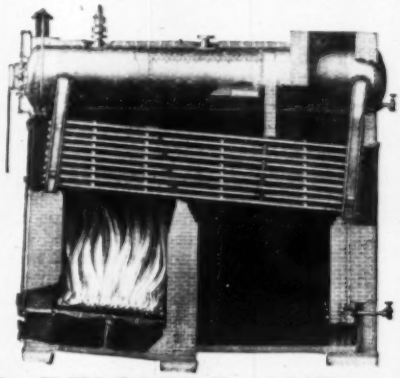
KEELER
BOILERS,
WATER TUBE AND RETURN TUBULAR



ARE RELIABLE AND SAFE
No Keeler boiler has ever exploded.
ECONOMICAL: cost of upkeep phenominally low.
EFFICIENT: numerous tests tell.
Catalog of either type on request.

E. KEELER CO., Williamsport, Penna.
BRANCHES: NEW YORK BUFFALO PHILA. PITTSBURGH BOSTON CHICAGO

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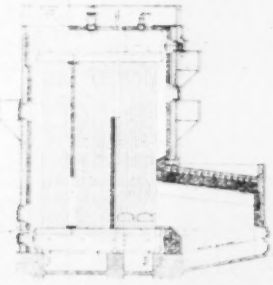
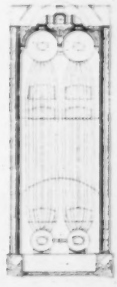
TANKS BREECHINGS STACKS





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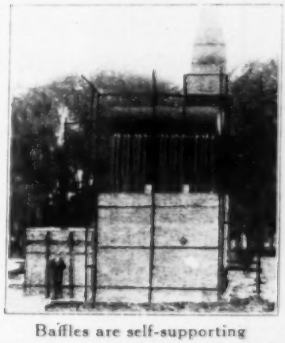

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No "special" parts

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Baffles are self-supporting

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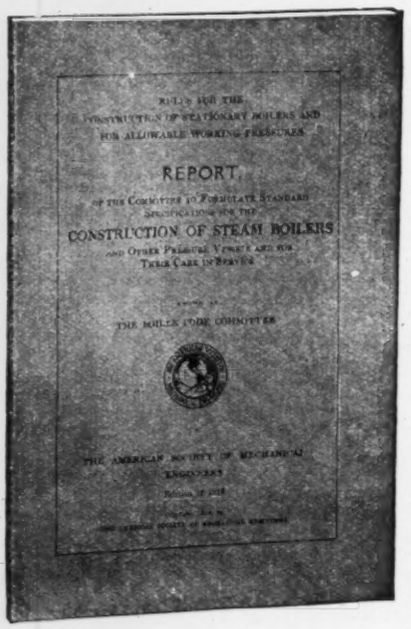
CLEVELAND, OHIO

A.S.M.E. BOILER CODE



1918 Edition

147 Pages, including appendix and index—35 illustrations

Price $1.50 $1.00 to members

A REPORT containing standard specifications for the construction, equipment and use of steam boilers, and embodying the collective knowledge of the world's leading experts.

The A.S.M.E. Boiler Code is now operative as a legal construction code in the states of Arkansas, California, Delaware, Indiana, Maryland, Michigan, Minnesota, Missouri, New York, New Jersey, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Utah and Wisconsin. It is also used as a standard by the leading boiler insurance companies, leading boiler manufacturers and our foremost consulting engineers. The U. S.Government now specifies that boilers for many important Departments are to be constructed in accordance with the A.S.M.E. Boiler Code.

Interpretations of the Boiler Code

The Boiler Code Committee meets monthly for the purpose of considering inquiries and rendering interpretations relative to the Boiler Code. When approved by the Council of the Society, these interpretations are published in MECHANICAL ENGINEERING and subsequently issued in data sheet form for convenience of reference.

The interpretations which have been issued to date cover matters of setting, erection suspension, and piping connections, as well as constructural details; and thus embrace a very valuable fund of information to everyone interested in steam boilers.

Complete sets of Interpretations from Case No. 200 to date are also obtainable at $1.50 a set (To members $1.25).

OFFICIAL BOILER STAMPS

Stamps for impressing the official symbols on power boilers as shown in Fig. 23 (page 87 of the Boiler Code, Edition of 1918) are obtainable only from THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Two forms of stamps are available—one, the regular hand stamp with ¾ in. symbol and the other, a special hammer-type stamp, with ½ in. symbol particularly serviceable for stamping thin boiler plate.

For the purpose of safeguarding the use of the stamp in certifying that power boilers are built in accordance with the A.S.M.E. Boiler Code, the order for each stamp purchased must be accompanied by an affidavit properly filled out and with signature of the company officially acknowledged by a Notary Public. These special affidavit forms are obtainable from the headquarters of the Society.

Manufacturer's Data Report Forms

Manufacturer's Data Report Forms are also offered for sale for the convenience of manufacturers who desire to enter power boilers in different states where the A.S.M.E. Boiler Code is operative. These blank forms are available at the following prices:

Single Copies 5c each
In lots of 6–24 . . . .3c each
In lots of 25–100 . . .2c each
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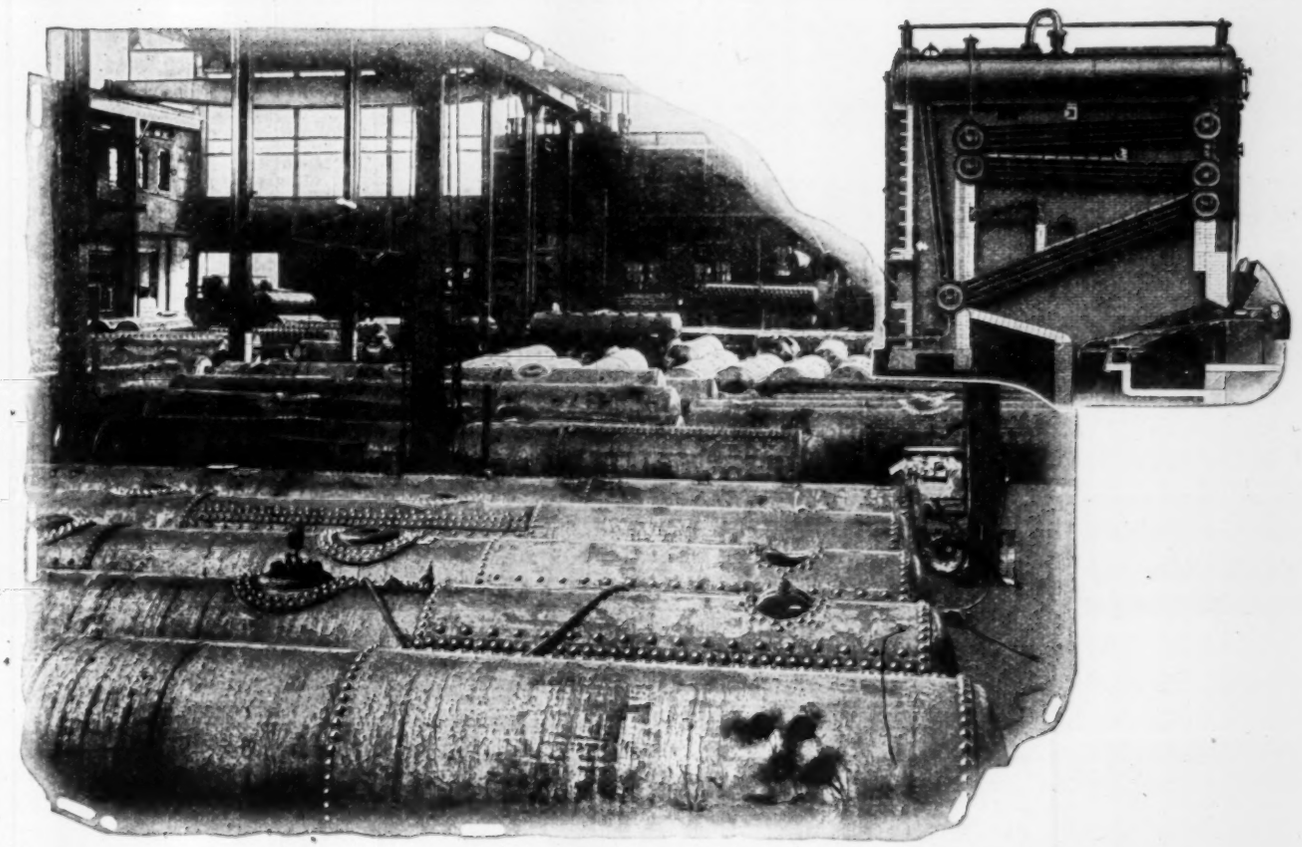
1½c each—

The American Society of Mechanical Engineers

Publication Sales Department **29 West 39th Street, New York, N. Y.**

PRODUCTION



Vogt Water Tube BOILERS

GREATEST VALUE PER DOLLAR—that is what you get when you purchase the better built Vogt Water Tube Boilers.

Large scale production as illustrated here reduces our cost to a minimum and enables us to give you maximum value per dollar.

Write For Bulletin W T-2

Henry Vogt Machine Co.

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MANUFACTURERS OF

WATER TUBE AND HORIZONTAL RETURN TUBULAR BOILERS :: :: DROP FORGED STEEL VALVES AND FITTINGS
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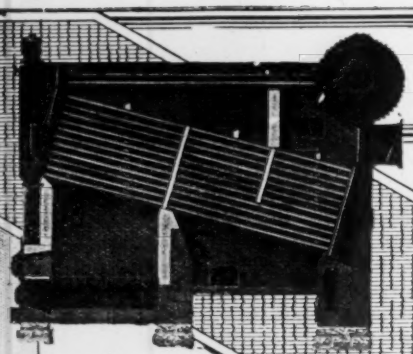
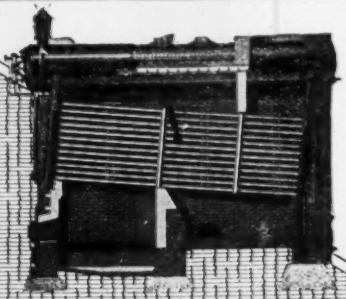
A.S.M.E. CODE BOILERS





The Casey-Hedges Boilers

are the result of years of experience in the design and construction of all types of boilers. They are built to conform with the standards of the A. S. M. E. Boiler Code—they are safe, economical and durable.

They are efficient and durable

All types of Casey-Hedges Boilers are designed to give the maximum of horse power with the minimum of fuel consumption.

Let our engineering department assist you in selecting your next unit.

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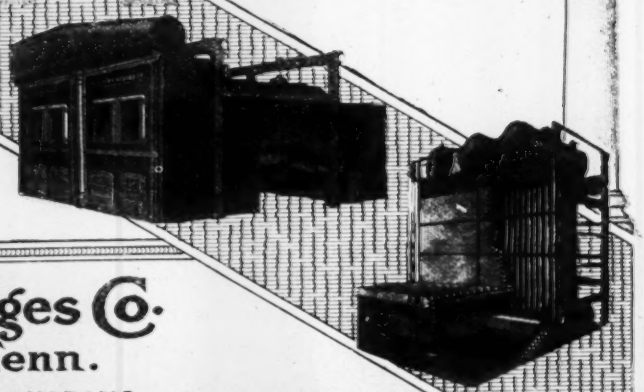

The Casey-Hedges Co.
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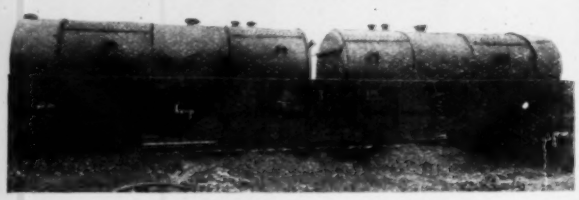
WEBSTER
Improved RETURN TUBULAR
BOILERS



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Space — Quick Steaming
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Webster boilers are in use in nearly every industry. They are highly endorsed by operating engineers, consulting engineers and managers wherever used.

Webster installations, made with careful consideration of all details involved, will effect large annual savings for you.

Write today for a solution of your boiler problems.

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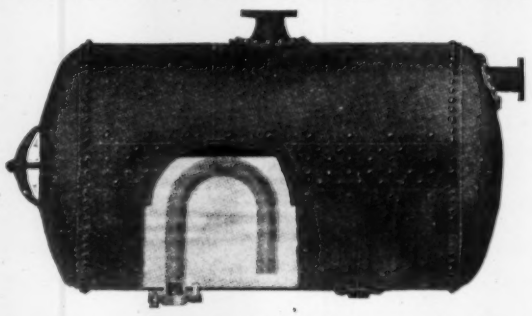
"WEBCO" BLOW-OFF DRUM



Patent applied for

A Blow-Off Drum properly designed and proportioned for insuring SAFE blowing down of high pressure steam boilers.

Built to conform with Insurance, Municipal and State Requirements.

Bulletin No. 10 furnished upon request.

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"WEBCO"—Horizontal Tubular Boilers
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FOERST FUEL-OIL BURNERS GIVE BOILER EFFICIENCY OF 82%

No. 7 Combination Fuel Oil & Gas Burner

Foerst Burners are regularly manufactured in a wide variety of styles and sizes (both conical and fan tail type) to meet every industrial requirement. They are safe and convenient for the operator, and seldom require attention, having no stuffing box, regulating cocks or packing to cause leakage.

Complete information, estimates, etc., furnished promptly on request.

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(See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment)

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WRITE FOR BULLETIN NO. 151

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BEACON, N.Y.

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In every public building or industrial plant, the installation of modern air handling equipment will increase its profit possibilities. *Your* profits can be increased if you take advantage of American Blower equipment and engineering service along the following lines:

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Bulletins on any of these subjects, embodying the knowledge acquired through forty successful years, will be sent upon request.

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American Blower

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FOR HEATING, VENTILATING, DRYING, AIR CONDITIONING, MECHANICAL DRAFT

The Taylor Stoker

Total maintenance—one ½ in. shearing pin after 2 years' continuous operation

Read this account of Taylor Stoker performance from an article in POWER (Sept. 4th)—

Low Stoker and Furnace Maintenance

As an interesting example of what an underfeed stoker will do under a protracted period of severe service with a minimum expenditure for upkeep, the accompanying photograph is presented. It shows a 7-retort stoker under a 7,500-sq.ft. boiler. The unit was installed in December, 1920, in the plant of the C. R. Wilson Body Co. of Detroit, Mich. At the time the photograph was taken, the stoker had been in practically constant operation night and day for 25 months. During this time it had been down only twelve days for washing the boiler, being taken off the line as little as possible, as the standby unit was not large enough to carry the peak loads of the manufacturing plant.

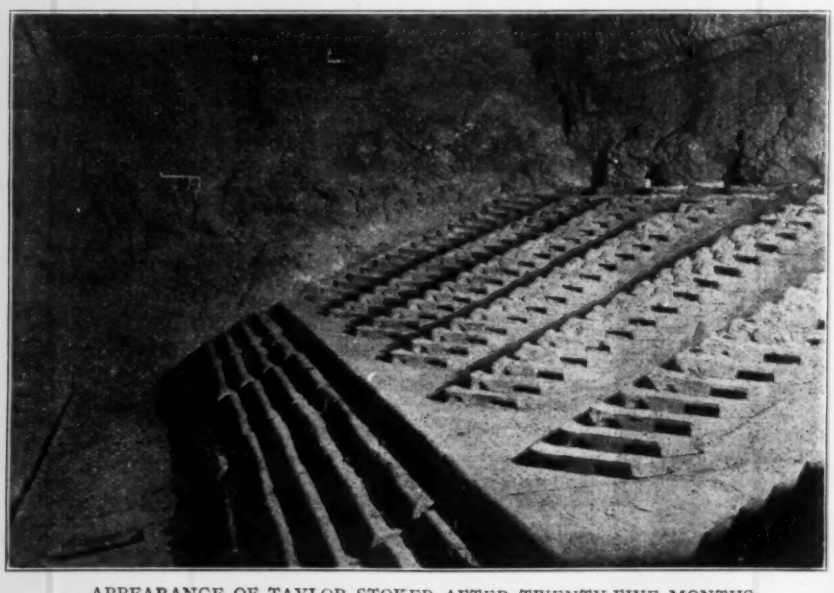
From December, 1920, to December, 1922, the stoker burned 14,600 tons of coal plus 300 tons of scrap wood and iron to evaporate 145,999 tons of water. During the winter, for twelve hours of the day the boiler operated at practically 300 per cent of rating and for the 12 hours at night at 250 per cent of rating. In the summer months, the day load ranged in the vicinity of 120 per cent of rating and the night load approximated the nominal rating of the boiler.

As the company had no other means of refuse disposal, it was necessary to burn on the stoker all the wood scrapped in the process of body manufacture. When a partly completed body was rejected and scrapped, the metal and wooden parts were put into the furnace together. During 1921 several bodies and several hundred tons of iron had to be scrapped. According to the chief operating engineer as high as one-half ton of iron a day had been thrown into the furnace. The theory that iron and coal create a clinker was well brought out in this case, for whenever there was any iron in the furnace a clinker would arch from the bedplate of the stoker to the bridge wall, of such proportions that when the dump grates were dropped, the clinker would support its own weight and could not be broken by a slice bar. It required the use of the steam-operated dump grates on this stoker, which would rise above the resting level and break the back of the clinker, before it would drop down into the ashpit.

Maintenance Cost Small

During the 25 months' period of this severe service the total maintenance consisted in the replacement of a ½-in. pin that had sheared. The photograph shows one section of the dump grates burned out and five sections of the extension grates burned on the top row, which will require replacement, and a few of the tuyere noses burned off sufficiently to require renewal. The front wall will have to be built up for a distance of about 4 ft., but the side walls and the bridge wall will not have to be touched. It will be noticed that the dead plates representing the hottest part of the stoker are in good condition. This is attributed to the air baffle in the windbox turning the incoming air against the dead plate to cool it and at the same time preheating the air, which then circulates up through the tuyere boxes and out of the tuyeres into the fuel bed.

The condition of the front wall and the burning out of the top sections of the extension grates is attributed to the fact that the siftings had not been cleaned out of the upper tuyeres for two years and in collecting had got into the extension grates in sufficient quantity to prevent the air from circulating freely. It will be recalled that the usual period recommended for cleaning out the siftings is every three or four months.



APPEARANCE OF TAYLOR STOKER AFTER TWENTY-FIVE MONTHS OF CONTINUOUS OPERATION

Our book, "Are Mechanical Stokers a Good Investment?" gives many more actual Taylor performances. Send for a copy today. You'll find it worth while.

AMERICAN ENGINEERING COMPANY

Thompson & Cumberland Sts.

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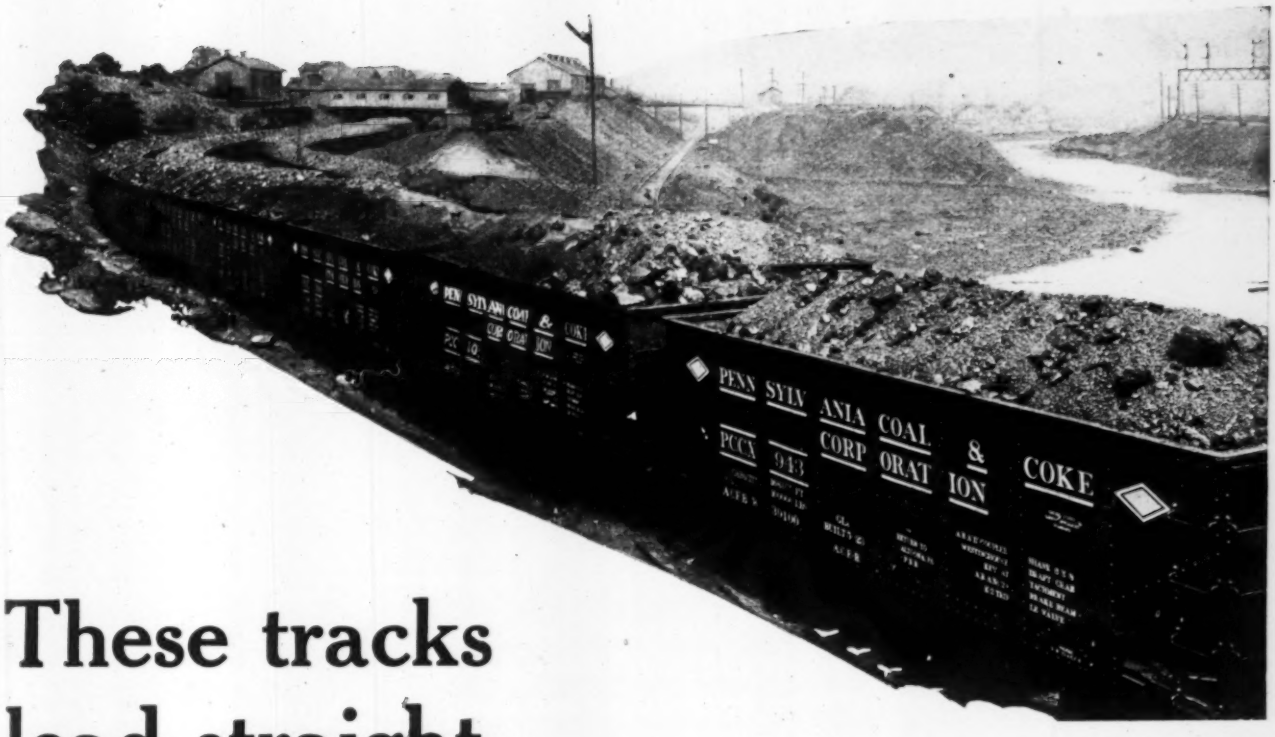

These tracks lead straight to your coal bunkers

ORIGINATING on the lines of the New York Central, Pennsylvania, and Cambria and Indiana Railroads, our coals move at the lowest freight rates to destinations on all Eastern roads.

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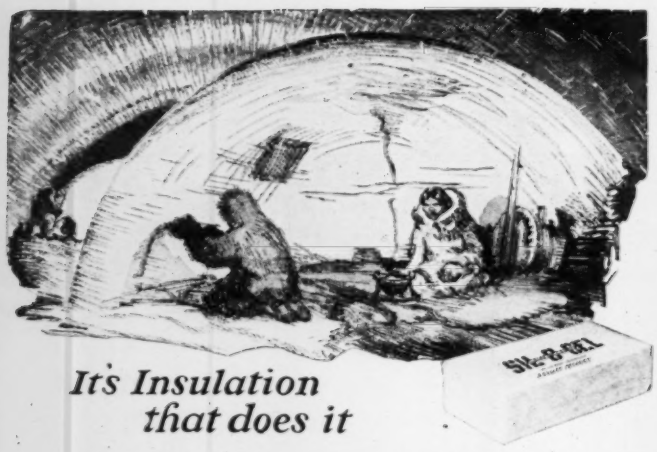

It's Insulation that does it

A TINY FLAME keeps the Eskimo's igloo warm and comfortable, despite the fact that the outside temperature may be many degrees below zero.

It's insulation that does it. Millions of microscopic air cells formed between the particles of tightly packed snow break up heat penetration and hold it within the hut. Large air spaces are not as effective, as the U. S. Bureau of Standards have decisively proved, and the perfect heat insulation only needs in addition to its countless minute air cells, a composition which withstands high temperatures, and sufficient structural strength.

All these requirements are found in SIL-O-CEL Heat Insulation—in world-wide service on all types of high temperature equipment. Tests by the Bureau of Standards prove it to possess a lower heat conductivity than any other insulation suitable for high temperatures. Furnished in forms which withstand without shrinkage, direct heats of 2000° F., SIL-O-CEL has ample structural strength, is easily applied and permanently effective.

A type for application to boilers, furnaces, ovens, kilns and similar heated units without change in design — Brick, C-22, Block, C-3, Powder, Cement.

Write nearest office for complete information given in Bulletin H-6C, or mail the coupon.

A CORRECTION

The crushing strength of SIL-O-CEL Insulating Brick was incorrectly reported in last month's advertisement as being 400 lbs. per square foot. This should read "400 lbs. per square *inch*" or 28 tons per square foot.

CELITE PRODUCTS COMPANY

New York-11 Broadway Chicago-53 W. Jackson Blvd. San Francisco-Monadnock Bldg.
Offices and Warehouses in Principal Cities
CELITE PRODUCTS LIMITED, New Birks Bldg., Montreal, Canada
CELITE PRODUCTS CORPORATION, Windsor House, London, S.W.1., England

CELITE PRODUCTS COMPANY—
Gentlemen: Send blueprints and Bulletin H-6C on SIL-O-CEL Heat Insulation for .....
(Give type of equipment)
Name .....
Company .....
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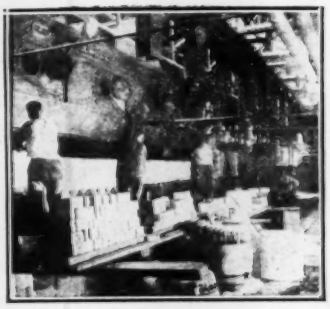
DURA-STIX

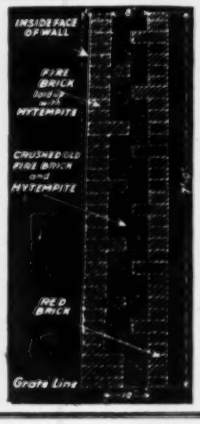


BONDS the Boiler Settings in the best known plants of America

OUTLASTS fireclay ***FOUR*** times. Try **DURA-STIX** and be convinced.

Booklet EM tells how

Keystone
Refractories Company
120 Liberty St., New York



Use your Old Fire Brick

You can crush your old linings and mix the crushed material with

HYTEMPITE

TO REBUILD YOUR SETTINGS

Note this sidewall section. Large power plants are using this method because it

Prevents Infiltration **Saves Fuel, and**
Reduces Radiation **Reduces Maintenance cost**

Booklet H-109-M tells how

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

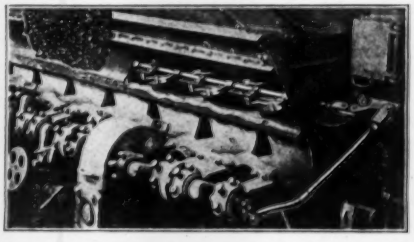
Hytempite is carried in stock in every industrial center for immediate delivery

QUIGLEY FURNACE SPECIALTIES CO., Inc.
26 Cortlandt St. New York

NEGUS-TIFFANY COAL AGITATORS

WILL CURE YOUR WET COAL TROUBLES

and increase boiler efficiency at all times



Saves Coal
Saves Labor
Saves Breakage
Saves Money
Saves Cussing

W. E. ELLIS CO.
Haverhill, Mass.

STOKERS

Builders of Mechanical Stokers for 35 years
Sales and Service Offices in All Principal Cities
Address Nearest Office
Westinghouse Electric & Mfg. Co.
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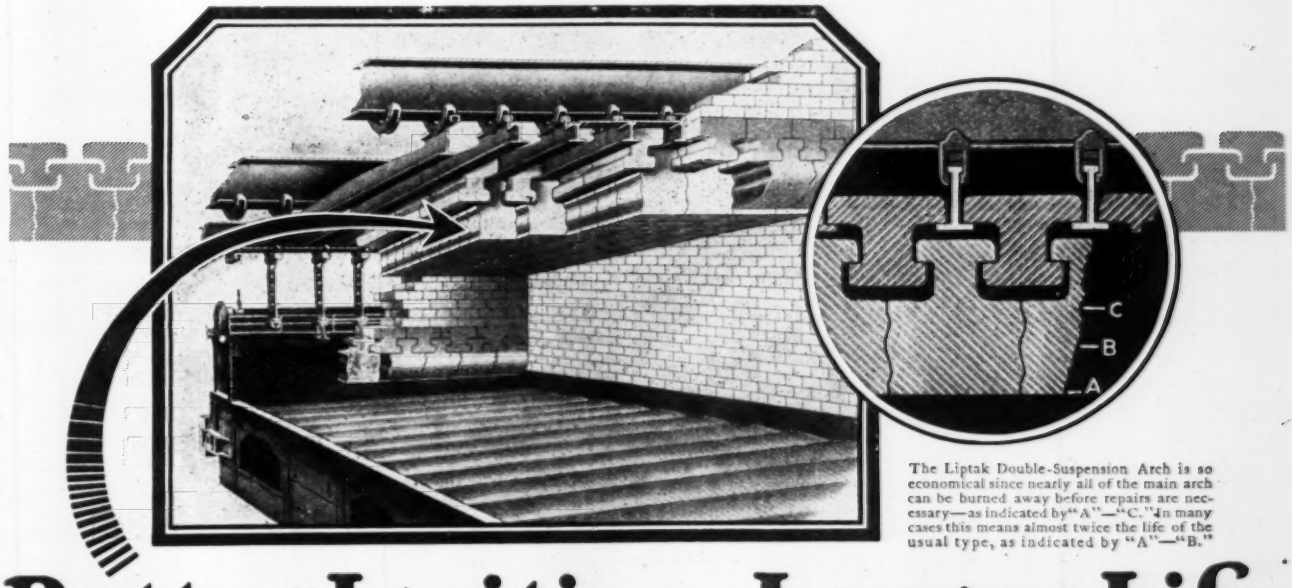


The Liptak Double-Suspension Arch is so economical since nearly all of the main arch can be burned away before repairs are necessary—as indicated by "A"—"C." In many cases this means almost twice the life of the usual type, as indicated by "A"—"B."

Better Ignition~Longer Life

Due to this Exclusive Arch Design-

This arch, an exclusive Liptak design, is doubly economical.

(1) It actually consists of two arches in one—with the double layer of refractories separated by two dead air spaces there is less loss of heat through the arch by convection. Naturally this confines the heat to the furnace and gives a more incandescent surface to the arch, resulting in better ignition.

(2) The double-suspended principle, which includes a main arch supported from a reserve arch, makes it possible to burn away practically all of this main arch before replacements are required. This means longer life for the arch blocks, fewer repairs and reduces the out-of-service period of your boiler.

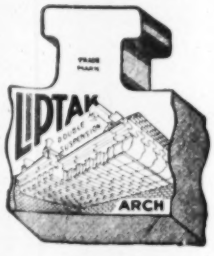
Repairs Can be Quickly and Economically Made

Only two types of repair blocks are necessary when you use Liptak Double-Suspension Arches. The Liptak Double-Suspension Arch is advanced in design and will interest every power plant operator.

Let us tell you more about it and why its use will actually mean greater savings for you.

We also manufacture a Single-Suspension Arch in which any damaged block can be removed individually without disturbing surrounding blocks. Another feature of the Liptak Single-Suspension design is the ventilated cast-iron support.

LIPTAK FIRE-BRICK ARCH CO., 20th St. & Prairie Ave., Chicago, Ill.



LIPTAK

Double Suspension Arch

Hot-Flow

True Worth Is Measured by Performance and Not by First Cost

The consistent satisfactory performance—under all conditions—of the many hundred International Water Softeners in this and other countries proves their design and construction to be scientifically and mechanically right.

Unless the water softener will deliver uniformly treated water minute after minute, hour after hour, during the whole day—the full benefits of treatment cannot be obtained.

And—results accomplished by the International Hot-Flow Softener in boiler plants prove that it alone fills the exacting requirement of absolute uniformity of treatment.

Are you interested in knowing the results and savings you can expect from an International Water Softener in your plant? Experienced service engineers are available to make a survey of your conditions and make a detailed report to you.

INTERNATIONAL FILTER CO.
WORKS AND GENERAL OFFICE
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INTERNATIONAL WATER SOFTENERS

WATER

WE-FU-GO AND SCAIFE SOFTENING SYSTEMS

Scaife Standardized Softened Water For Boiler Feed and all Industrial Uses.

Scaife Filters for all Purposes

NEW YORK: 26 Cortland St.; CHICAGO: First Nat'l Bank Bldg.

(See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment)

WM. B. SCAIFE & SONS CO. PITTSBURGH, PA.

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REG. U. S. PAT. OFF.

In SINGAPORE, STRAIGHTS SETTLEMENTS, PORTO RICO, CANADA, Throughout the U.S.A.—and on steamships using waters of the various ports of the world, UNISOL is being SUCCESSFULLY used; BY THOSE WHO ARE INTERESTED ALWAYS TO THE POINT OF MAINTAINING FIRST CLASS OPERATING CONDITIONS.

If we were not 100% sure that UNISOL will correct undesirable boiler feed water conditions, we would not offer it, nor would we forward it throughout the world, ON APPROVAL.

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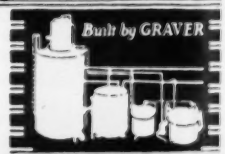
GRAVER Corporation is the only organization building complete in their own shops all types of Water Softening Equipment.

The GRAVER Hot Process Softener is recommended for steam power plants. Bulletin M-504 gives complete details of its operation. Copy will be sent on request.



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Steel Tanks and General Steel Plate Construction
Water Softening and Purifying Equipment

310 Todd Ave., East Chicago, Ind.

HEATERS COOLERS

HEAT INTERCHANGERS

Write for Catalogue E-2

Croll-Reynolds Engineering Co. Inc.
95 Liberty St., New York City

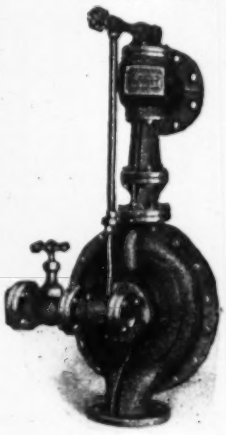
(See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment)

Be sure to visit Booth No. 18 while at the Power Show

For High Vacuum—Economically

The Radojet Air Pump

made in five different types



Standard Radojet

Single Stage for low vacuum up to 26".

Standard Two Stage for high vacuum.

Two Stage with Surface Inter-Condenser.

Two Stage with Jet Inter-Condenser.

Two Stage with combined Inter and after Surface Condensers in which the exhausted Air is not brought in direct contact with the condensate. The total heat in the steam required for operation is saved and is absorbed by the main condensate.

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C. H. Wheeler Manufacturing Co.

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VERSUS

COOLING TOWER—*Which?*

Which type of water cooling device is better for your plant?

The answer depends on the nature of the duty, the climate, and the amount and value of available space.

No sweeping claim of superiority for either type can be justified in the absence of specific information covering plant conditions.

We investigate, then quote you on best type for your particular service.

THE COOLING TOWER CO., INC.

17 John St., New York

COOLING TOWERS AIR WASHERS

SPRAY NOZZLE SYSTEMS

Write for Catalogue 9A

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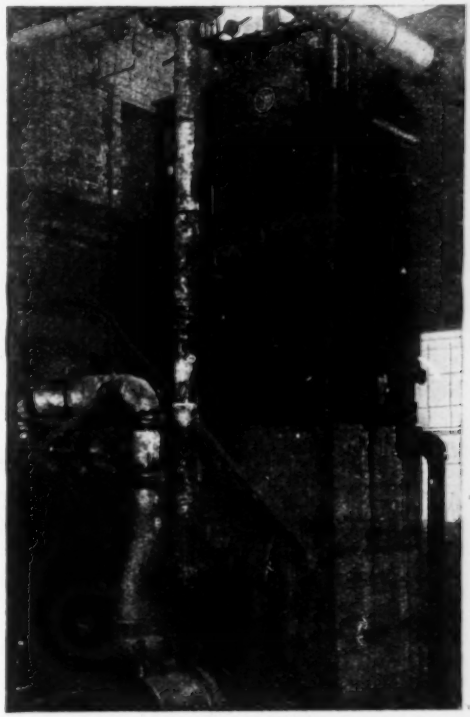
COCHRANE METERING HEATER



Tells What You Wish To Know

THE engineers of many modern and efficient plants have been able to improve efficiency still further by a careful analysis of operating conditions.

By means of the Cochrane Metering Heater they first determine how many pounds of water are evaporated per hour, per day and per week. From this the evaporation per pound of coal is calculated and any improvement or falling off of evaporation is ascertained. The Cochrane Metering Heater enables the engineer:

To determine the best method of firing,

To determine how often boilers should be cleaned of soot and scale,

To determine the most efficient way of handling draft,

To determine when boiler efficiency falls off due to defective baffles or settings.

The Cochrane Metering Heater, besides measuring water, performs all the functions of a standard open feed water heater. It utilizes the exhaust steam to heat the water up to steam temperature, saving about 1% of fuel for each 11° F. rise in feed temperature. It automatically admits the raw make-up water required to supplement the condensed returns. It purifies the water by driving off gases and precipitating some of the scale forming substances. It serves as a hot well or returns tank, etc.

Our engineers would, after learning the conditions of your plant, be glad to suggest ways in which you could improve economy. Ask for Catalog K-1080.

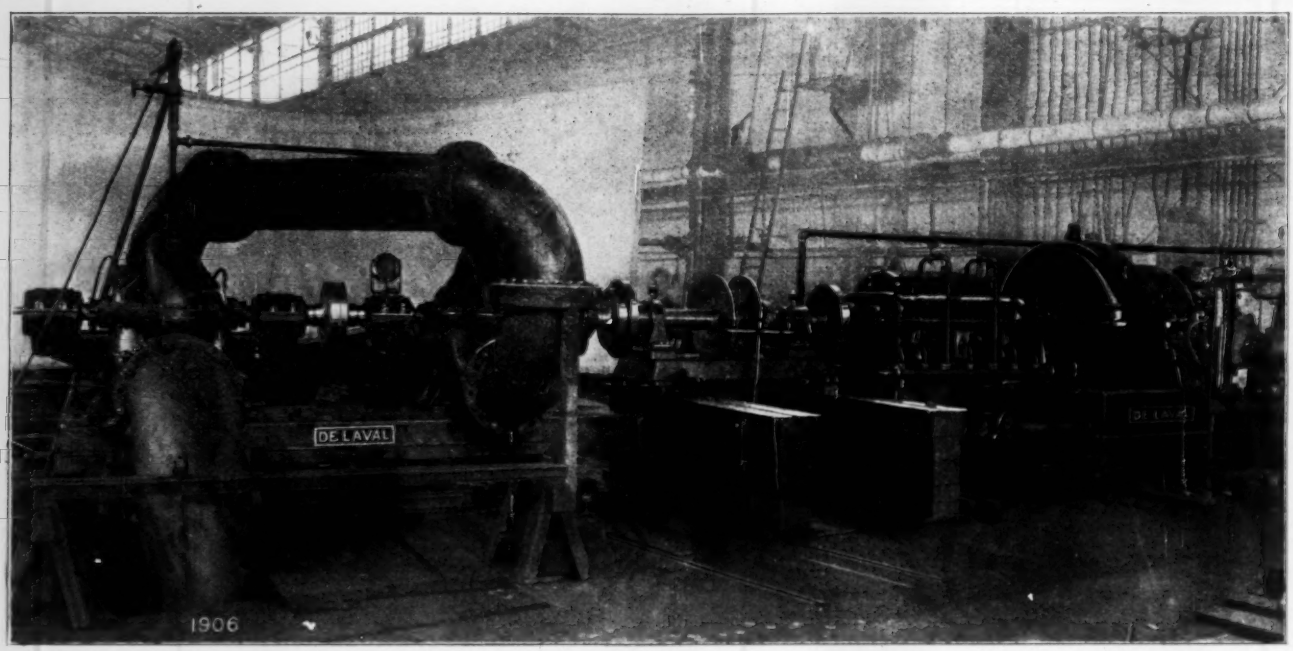
H.S.B.W.-COCHRANE CORP.

Formerly Harrison Safety Boiler Works

3199 N. 17th Street Philadelphia, Pa.

Also at Atlanta, Baltimore, Birmingham, Boston, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Greenville, S. C.; Hazleton, Pa.; Houston, Indianapolis, Kansas City, Little Rock, Los Angeles, Minneapolis, New Orleans, New York, Pittsburgh, Richmond, Rochester, St. Louis, Salt Lake City, San Francisco, Seattle, Syracuse, Tucson, Toronto, Montreal, Halifax.

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment 211



Six million gallon per day turbine driven pump on test in De Laval Works

The De Laval Test Room Is For Your Benefit

EVERY De Laval unit is thoroughly tested before leaving our works. This insures:

1. That the machine as shipped is correct mechanically, and
2. That the equipment will give the full efficiency and capacity specified, guaranteed and paid for.
3. It also provides our designing engineers with information regarding the results of changes and improvements, enabling them to maintain the lead as regards efficiency and other operating characteristics.

The purchaser should always require complete and accurate tests, and as he is usually not equipped to make such tests, he should insist that the manufacturer be equipped to make proper tests before shipment. This is preferable in any case, as it provides opportunity to remedy small defects before the unit is shipped, thus often avoiding long delays and expense to the user after installation.

Ask for our Catalog B-58

(See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment)

De Laval Steam Turbine Co.

Trenton, New Jersey

LOCAL OFFICES

Atlanta, Birmingham, Boston, Charlotte, Chicago, Cleveland, Dallas, Denver, Duluth, Indianapolis, Kansas City, Los Angeles

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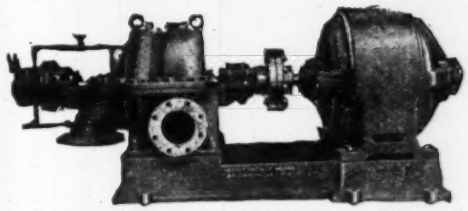

Horizontally Split Multi-Stage Pump

This type of pump is needed when operating under high heads and pressures, such as supplying water to hydraulic giants, etc. It is especially adapted for high efficiency and for operating at high speed. Suction and discharge openings are in the bottom half of the shell, therefore top can be removed without disconnecting them. Write for Bulletin No. 19A-1.

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment.

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Since 1864 Builders of Double Centrifugal Pumps Steam Engines

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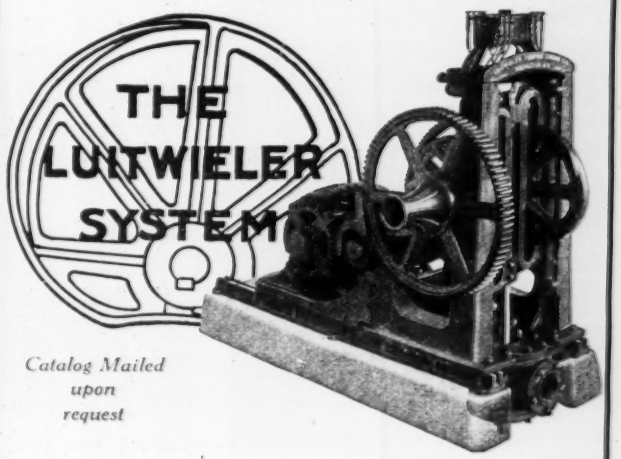
THE LUITWIELER SYSTEM



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Reciprocating Cams and Balanced Parts are the basis for High Efficiency of—

LUITWIELER
Non-Pulsating Deep Well Pumps

For Automatic Electric and Hydro-Pneumatic Pressure Water - Systems Deep Well and Pressure Pumps.

Luitwieler Pumping Engine Co.
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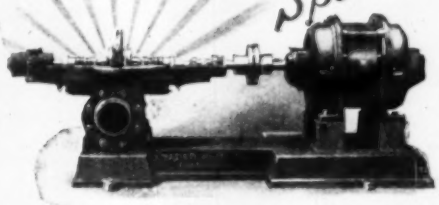
QUALITY *Built by Specialists*

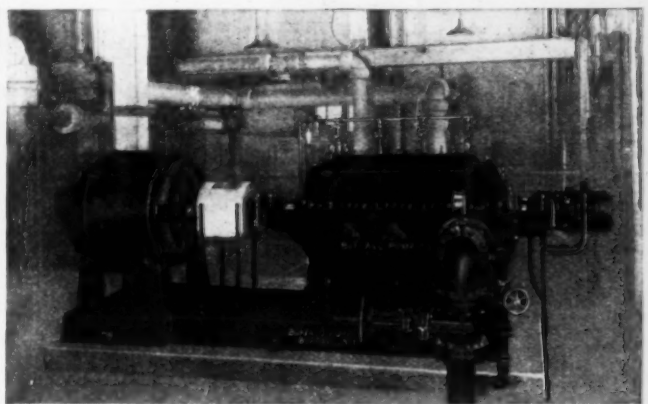


THE "vitals" of every Taber Pump reveal built-in quality; every construction detail receives careful, expert attention. The result is a pump that gives complete satisfaction in operation.

Taber Pumps are built to suit your particular needs. Submit *your* problems to us.

Illustration: "Vitals" of Taber S-L Double Suction Centrifugal Pump, bronze fitted.

TABER PUMP CO. Buffalo, N.Y.
Pump Specialists



5" Four Stage Class RDS Pump at Miller Rubber Co.,

This *"Buffalo"* **Pump handles Boiler Feed Water**
500 G. P. M. (810 ft. Head) 1750 r. p. m.

with entire satisfaction and is but one of a complete line made for every industrial requirement. Send for Catalog. #952-A-80

Buffalo Steam Pump Company
148 Mortimer St., Buffalo, N. Y.

Lammert Rotary Vacuum Pumps and Pressure Blowers

FOR ANY HIGH DRY VACUUM SERVICE OR PRESSURE WORK UP TO 25 POUNDS

EFFICIENT, DEPENDABLE, AND DURABLE—

AUTOMATIC OILERS MAKE THESE PUMPS PRACTICALLY SELF OPERATING

"Two Stage Type" for Highest Vacuum

DIFFERENT TYPES AND SIZES FOR THE VARIOUS SERVICE REQUIREMENTS —ANY KIND OF POWER DRIVE—

SEND FOR CATALOG B3-C.

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Even the *Best* Nozzles May Clog!

But—clogging in high grade nozzles is a negligible item under ordinary conditions. Our 12 years' experience proves this—as do 1400 Spraco Cooling Ponds in 45 states and 23 foreign countries.

Bulletin C-22 on request

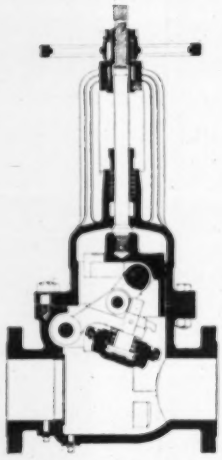
SPRAY ENGINEERING COMPANY

60 High St. Boston, Mass.

TRADE MARK

SPRACO BOSTON

SCHUTTE REGRINDING SWING GATE VALVES



Will hold absolutely tight on high pressure superheated steam lines with minimum attention.

Note that the disc swings clear of the flow when the valve is open.

Seat faces can be reground without breaking pipe joints.

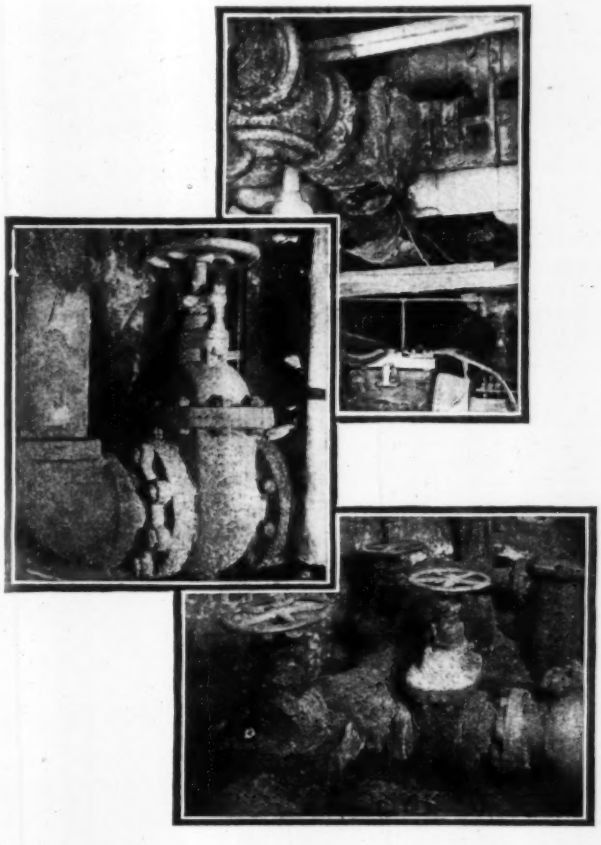
Cast steel body
Monel mounted.

For further information address our Valve Department and ask for Bulletin 8-G-17.

SCHUTTE & KOERTING
1166 THOMPSON STR
PHILADELPHIA, PA

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

Here's *service*—



These Kennedy Veterans are all over 35 years old—and still too good to be replaced.

These Kennedy old-timers show visible evidences of their long-continued operation, but the marks of age are all on the outside. With 35 years of service behind them, each gate still closes tightly in its seat, each stuffing box is still in good working order, and each stem is still perfectly reliable.

The Kennedy Valves of today are *doubly* sure to give similar good service. The conscientious and skillful workmanship that has enabled these veterans to give such long and honorable service are now supplemented by the successive improvements in design and construction resulting from an additional generation valve-building experience.

You are safe in standardizing on Kennedys.

336

Send for the new Kennedy Catalog.

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Chicago, 228 North Jefferson Street
SALES OFFICES: Salt Lake City, El Paso, Seattle

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Positive assurance of uniform production

Manufactured under the Lunkenheimer Method which involves materials specifications perfected to meet the high standard of Lunkenheimer "Quality" as well as workmanship, inspection and testing specifications of a character which assures the uniform presence in the ultimate assembly of all the elements essential to efficient and economical service results.

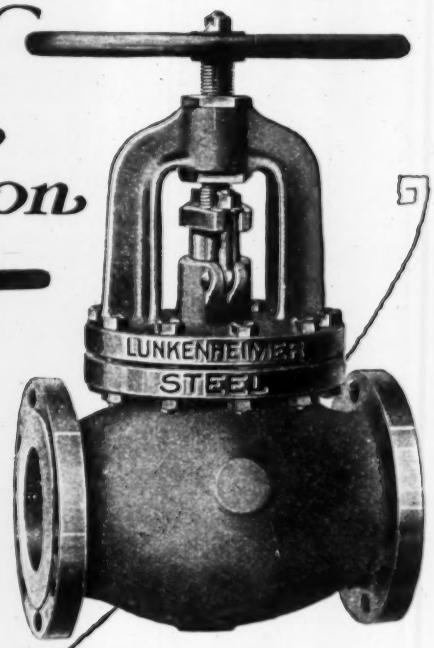

Fig. 606
Globe

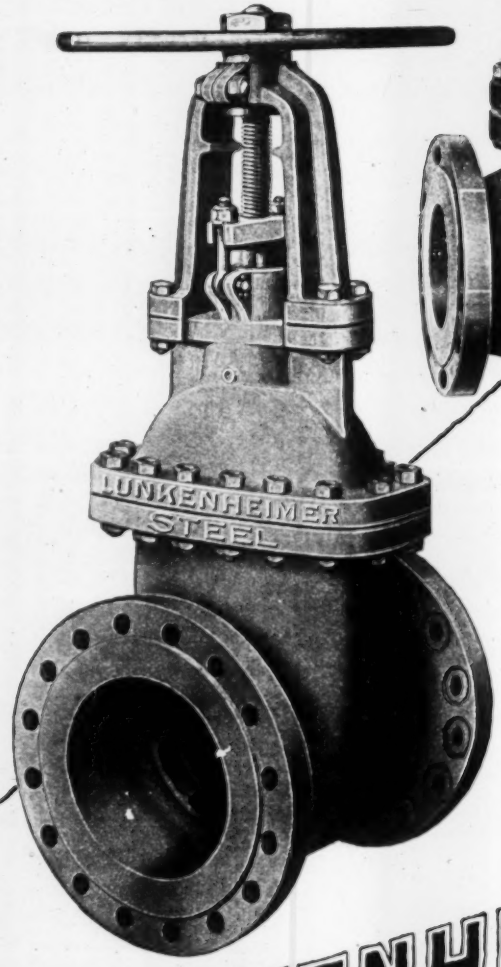

Fig. 1353
Gate

Fig. 1410
Safety Non-return

LUNKENHEIMER STEEL MONEL MOUNTED VALVES

provide a large factor of safety at their maximum guaranteed working pressure of 350 pounds and 800° F. total temperature.

Of correct design, generous proportions, unparalleled materials, exacting workmanship, with renewability of all parts, Lunkenheimer Steel Valves embody that strength and durability so essential to safe and economical continuity of service.

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15-19 A-4

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LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
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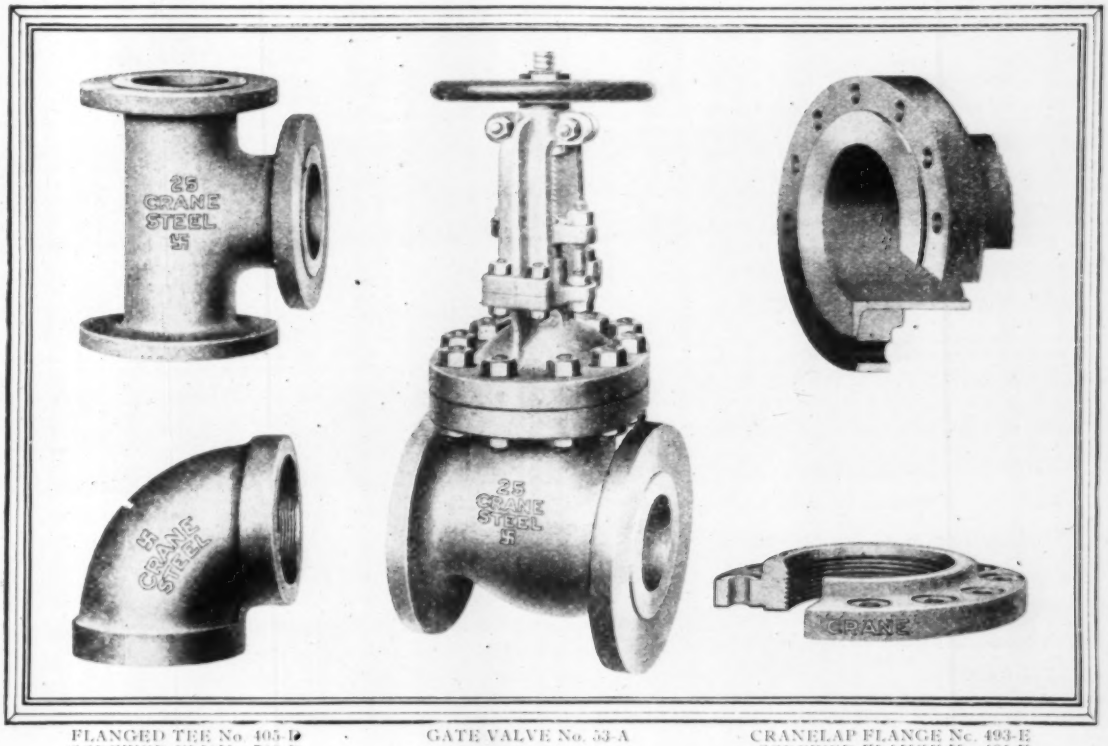

FLANGED TEE No. 405-D
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CRANE "SERIES 25" CAST STEEL MATERIALS

For use in power plants where pressures run as high as 250 pounds and total steam temperatures may reach 750 degrees, Crane has developed a new specialized line of piping materials, designed by engineers of wide experience, known as "Series 25."

Valve bodies, bonnets and discs are cast steel; seat rings, disc rings and stems are monel metal. Fittings are Crane cast steel, accurately machined.

For descriptive literature and specifications of Crane's six new lines of steel valves and fittings, telephone or write the Crane representative at the Crane branch near you.

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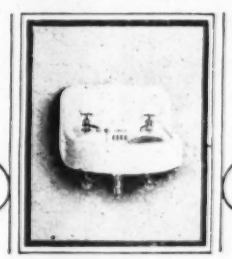

Crane "Norfolk" Lavatory

BARCO
Flexible Joints

USED AND RECOMMENDED FOR

OIL—STEAM—AIR—WATER, ETC.

Steam Shovels
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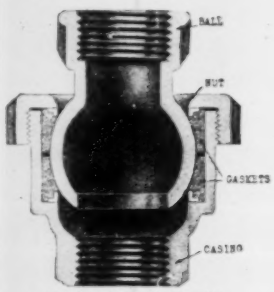
Railroad Cars



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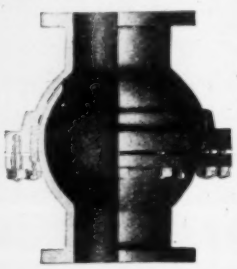

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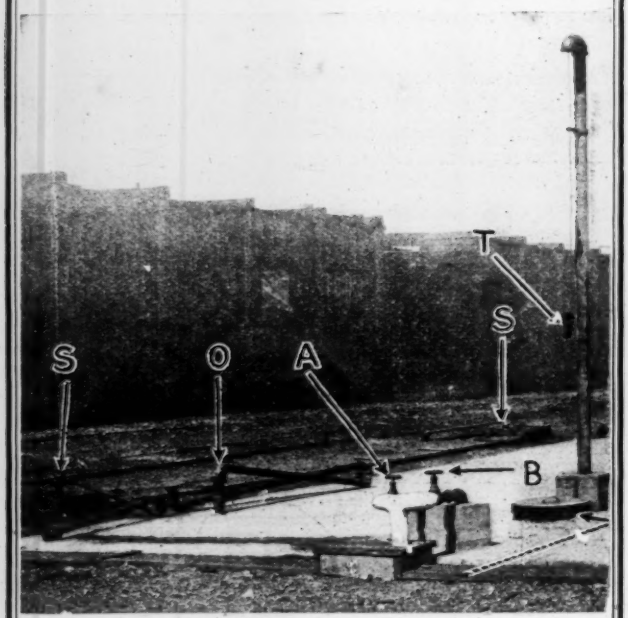

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Will you let us discuss your problems with you? Catalogs on request.

BARCO MANUFACTURING CO.

1801-1815 Winnemac Ave., CHICAGO, ILL.

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COPPER EXPANSION JOINTS

For Low Pressure and Vacuum

Made in All Sizes up to 96" Dia. Furnished Standard or with Special Drilling and Face to Face Dimensions if Desired.

Write for Prices

Can Make Prompt Shipments

Hamilton Copper & Brass Works Co., Hamilton, O.

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CAST IRON PIPE THAT MAKES ITS OWN JOINTS

—no packing, no calking, nothing to deteriorate. Tight—flexible—dependable. Used the country over for water, gas and other service where freedom from leakage is essential.

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Chicago Atlanta Dallas San Francisco

UNIVERSAL CAST IRON PIPE

(See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment)

445

United States Cast Iron Pipe & Foundry Co.

General Office, Burlington, New Jersey

Perfect tightness at every joint

indicates good management and affords real savings!

LEAKS at screw-thread joints are veritable eyesores, and very often give the first impressions that form lasting opinions.

Make criticism from this source impossible and protect your professional reputation by laying up every screw-thread joint with Smooth-On No. 3! This will settle the leak question for good and leave your mind, time and repair money free for bigger things.—Besides, the tightness of your lines, the tidy surroundings, and the *useful* delivery of *all* fluid and pressure will reflect credit upon you.

Insistent and persistent use of Smooth-On No. 3 as your only pipe-joint filler will confirm your judgment in the after years, because Smooth-On No. 3 retains its full metallic iron body, without shriveling or shrinkage. Nothing can dry or blow out.

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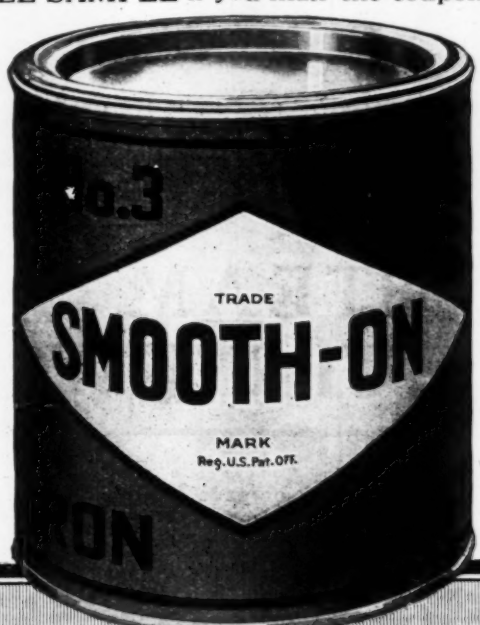
Get Smooth-On No. 3 all ready to use, in the convenient gray-labeled 1-lb., 5-lb. or 10-lb. tins. At your dealer, or if you will send us his name, we will help him to supply you.

FREE SAMPLE if you mail the coupon



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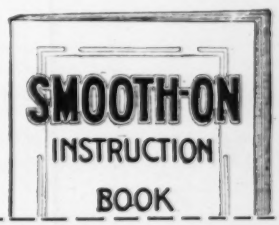
This 144-page book of simple directions and diagrams will post you well about Smooth-On, where to use each grade, how to apply for best results and what to expect from the finished job, based upon pictures and data from over 100 typical applications.



Smooth-On Manufacturing Co.,
570 Communipaw Ave., Jersey City, N. J.

Please send the free sample can of Smooth-On No. 3 and also copy of the Smooth-On Instruction Book.

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Do it with SMOOTH-ON

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FLANGES AND FITTINGS
for
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Taylor's Spiral Riveted Steel Pipe is furnished with FORGED STEEL FLANGES attached. These flanges expand evenly with the pipe, and cannot be broken by any possible condition that may arise in the piping system.

SHEET STEEL FITTINGS are made according to your special designs to meet the most difficult or unusual conditions.

Frequently a large amount of heavy cast-iron fittings can be eliminated; and the piping system made of wrought steel throughout by the use of special fittings and outlets on our pipe—thus saving much time and expense in the installation.

The long experience of our engineering department in designing special fittings is at your service.

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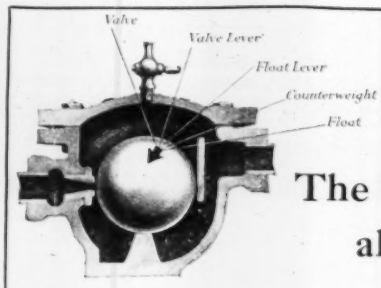

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It is so simple that it cannot get out of order, which gives it a reliability that is making thousands of satisfied users come back for more. It is a trap that you can install and forget.

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Economize on fuel. Keep the water in your boiler at proper level with a Peters Water Line Governor. It's automatic. Guaranteed to maintain an even water line and give entire satisfaction on steam pressure up to 50 pounds. Furnished with water gauge. Order direct or from any representative at these prices: ¾", $40; 1", $50; 1¼", $60. Send for Steam Specialties catalog.

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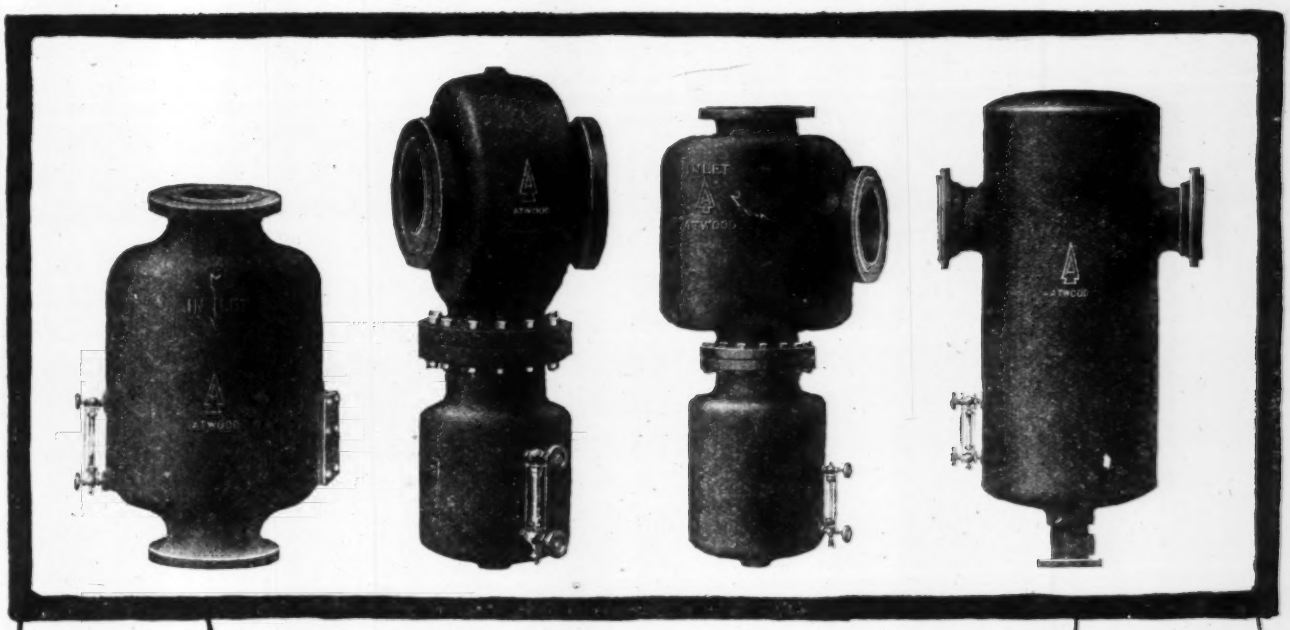

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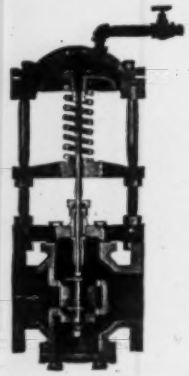
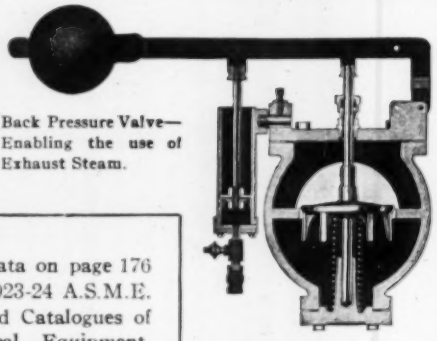


Reducing Valve—from High to Low Pressure



Back Pressure Valve—Enabling the use of Exhaust Steam.

Automatic Pump Governor—Returning Condensate to Boiler.

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All our equipment is made to meet the demands of modern power plant installations.

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Beginning at the boiler with the **Non-return Pilot Valve** that closes in case of rupture to either power piping or boiler.
High and Low Water Alarm indicating when not enough water or two much is in the boiler.
Feed Water Controlling Device to maintain constant water level in high pressure boilers.
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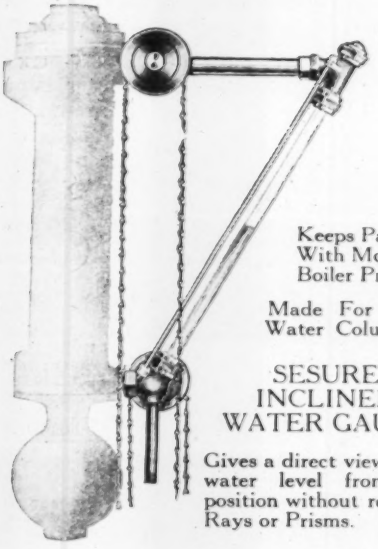

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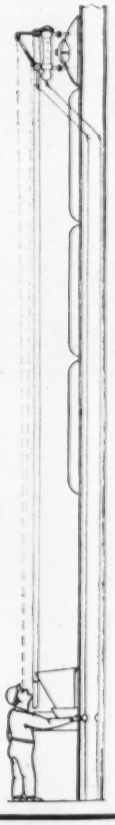

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This article deals with the lubrication of steam engines, internally and externally, and with various types of steam turbines.

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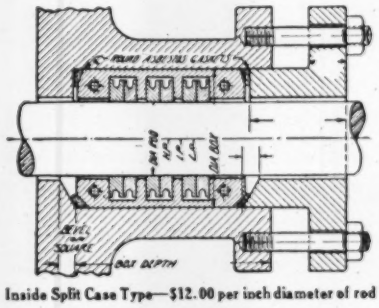

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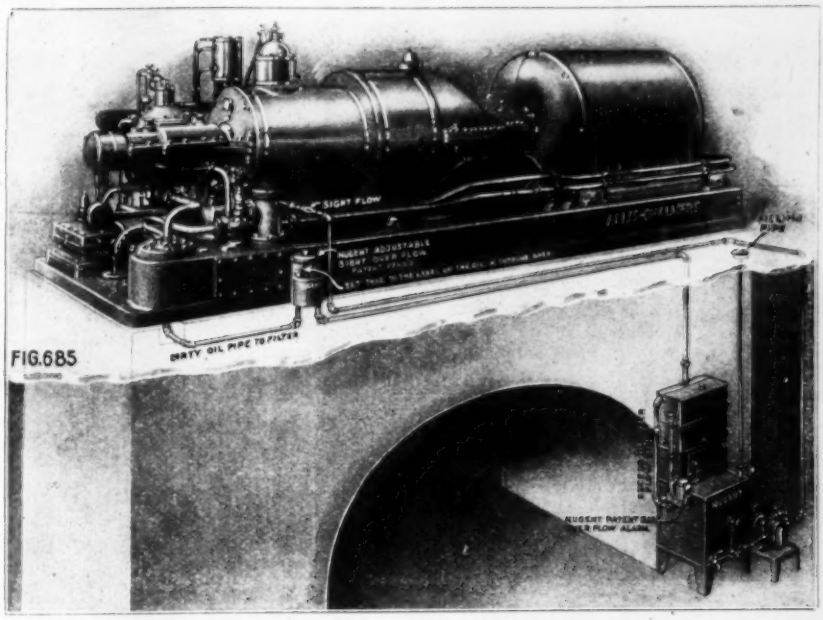

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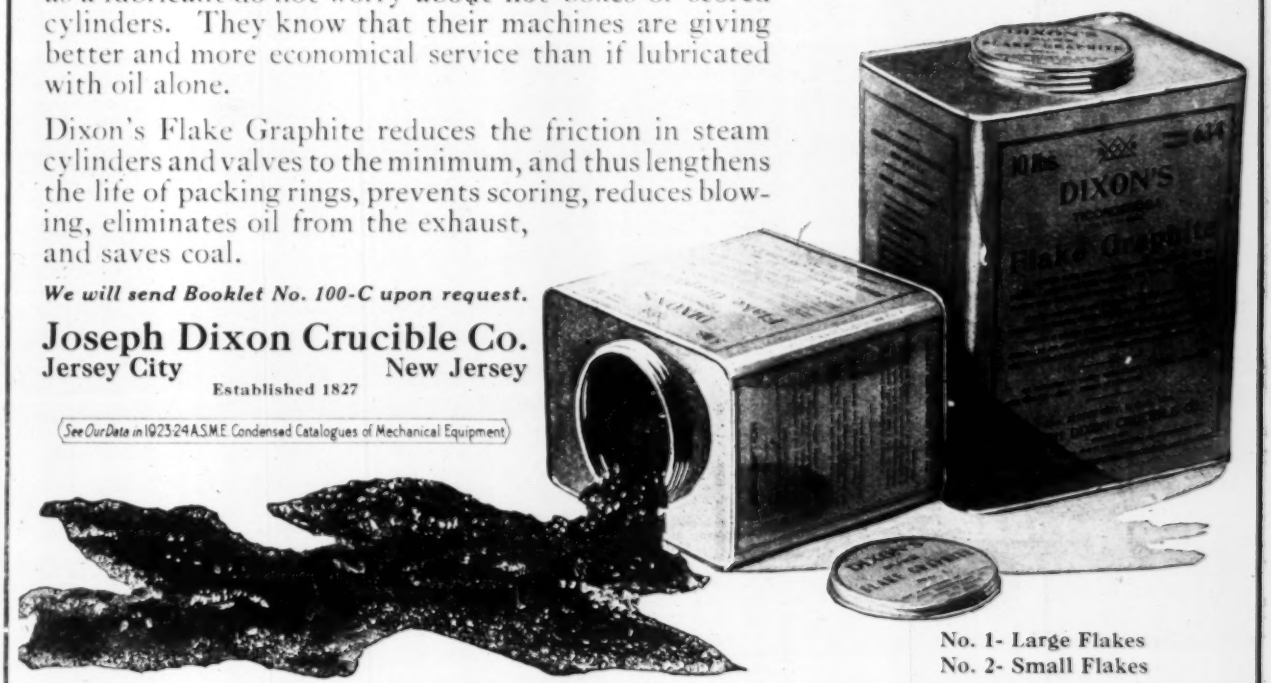

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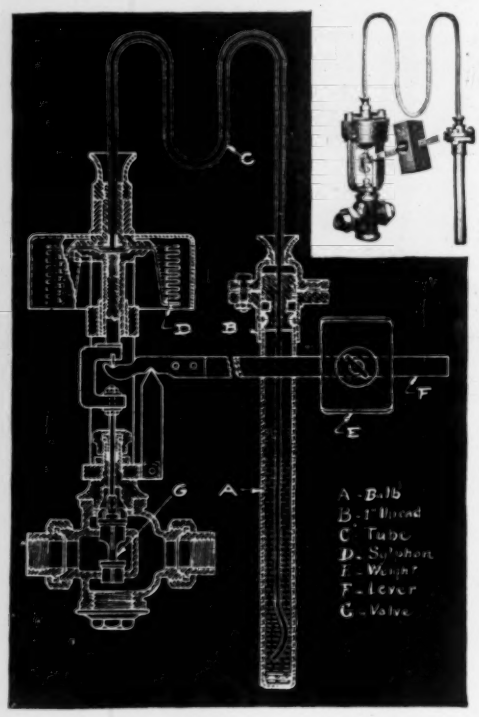

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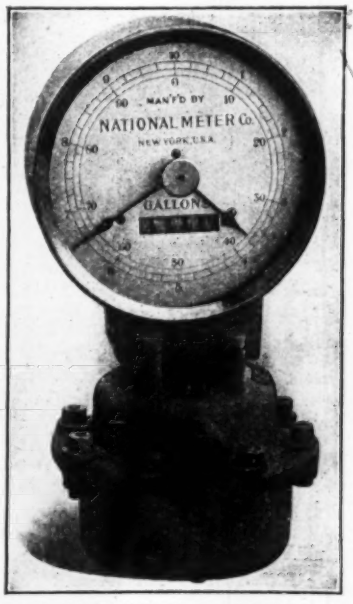

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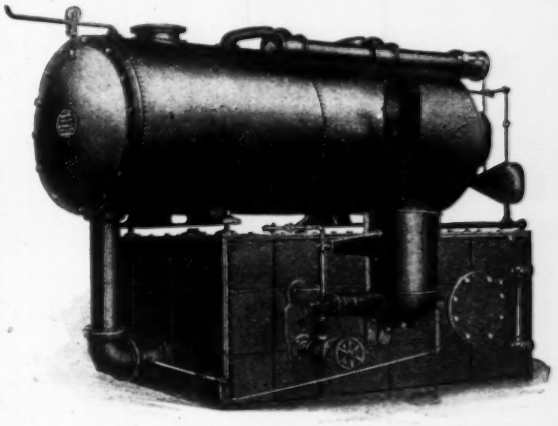

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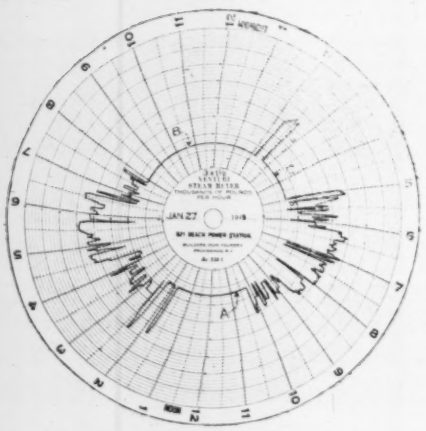

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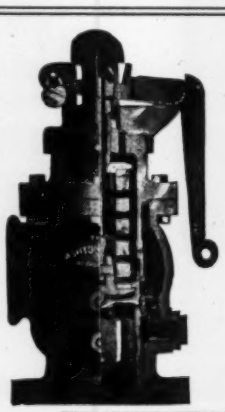

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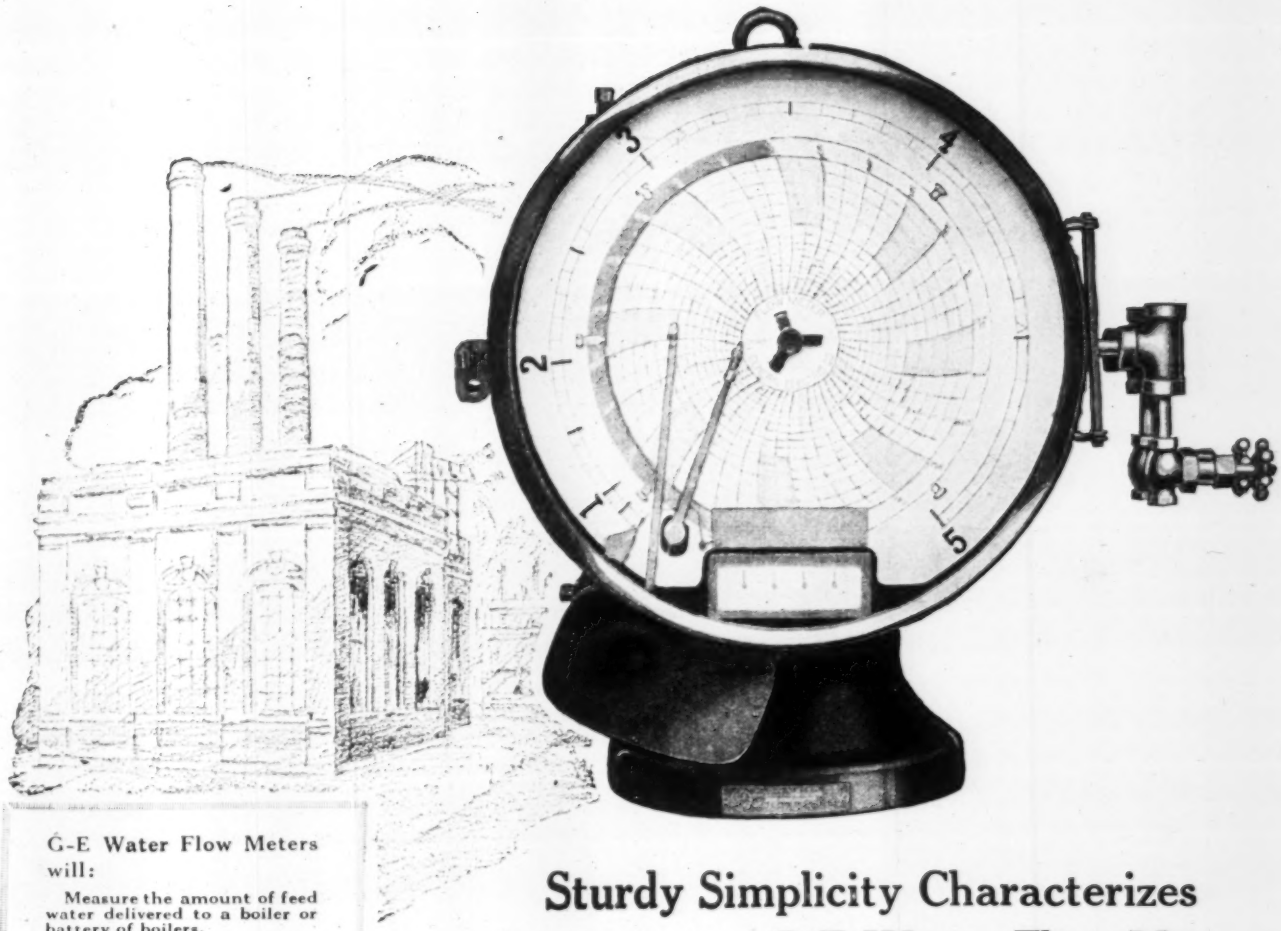

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for measuring steam, air, water, etc.

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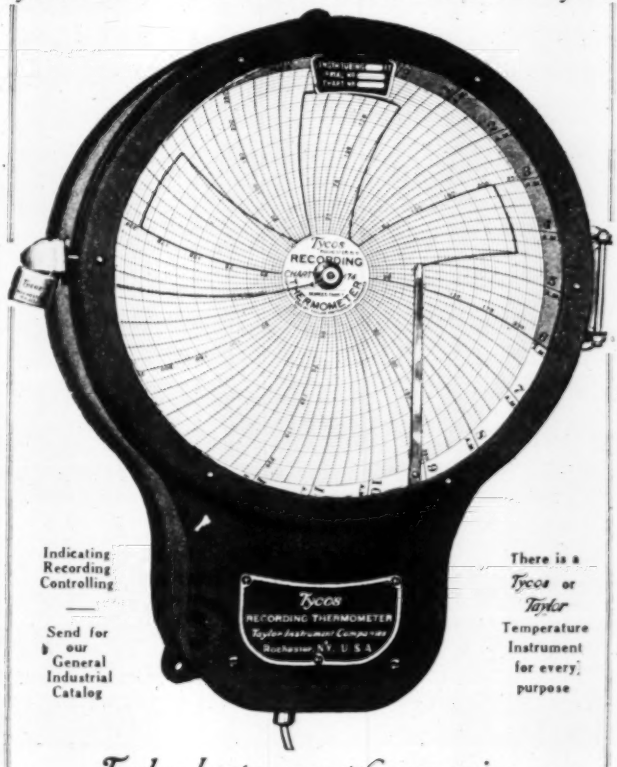

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For Bulletin 250
It gives full details and illustrates the application of Bacharach (S & H Type) Electrical CO_2 Meters, specially designed for practical and efficient operation in boiler-rooms.
Bacharach Industrial Instrument Company
7002 Bennett St., Homewood, Pittsburgh, Pa.
BACHARACH
INDUSTRIAL INSTRUMENTS

ACCURATE
Within ¼ of 1%

THE unrivalled working standard and precision test instrument.

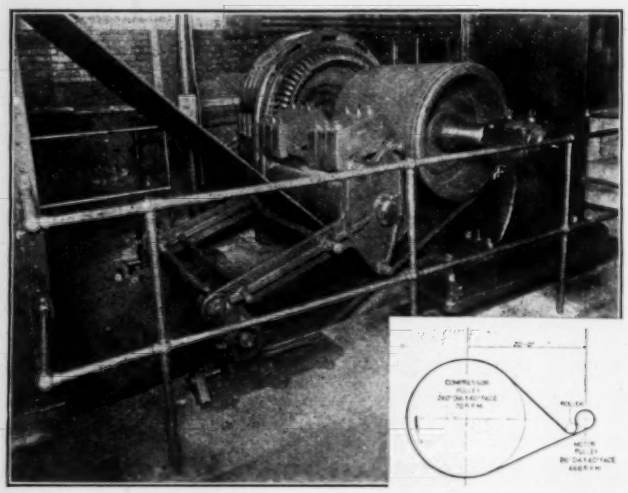
Made in 3 forms—offering a development in electrodynamometer wattmeters not obtainable in any other similar type of instrument. Its accuracy of ¼ of 1% is guaranteed on either D.C. or A.C. circuits at any power factor and frequency to 133 cycles per second and any wave form. Doubly shielded—effectually protecting it against stray fields. Stands double its normal load capacity. Has double ranges for both current and voltage circuits. Not affected by any ordinary degree of temperature change. Exceptionally small power consumption. Gives indefinite service. Special instruments available for unusually low factors.

Write for Bulletin 2002 giving complete detailed information

Weston Electrical Instrument Company
40 Weston Ave., Newark, N. J.
Branch Offices in All Principal Cities

WESTON
Electrical Indicating Instrument Authorities Since 1888
STANDARD-The World Over

THE LENIX DRIVE



Is not an idler. It is a "belt wrapper" scientifically applied to belt drives for the purpose of eliminating belt slippage and increasing the efficiency of the drive.

Booklet

"Saving Slippage and Space"

contains interesting data on belt drives. Send for a copy.

See Our Data on Page 470 of the 1923-24 A.S.M.E. CONDENSED CATALOGUES of MECHANICAL EQUIPMENT

F. L. SMIDTH & CO.,

50 Church Street **Engineers** **New York, N. Y.**

Information on Gears and Gear Drives

Title	Author	Order No.	Prices Mem.	Non-Mem.
Spur Gearing on Heavy Railway Motor Equipments	Norman Litchfield	1219	.25	.40
Investigation of Efficiency of Worm Gearing for Automobile Transmission	William H. Kenerson	1371	.25	.40
The Strength of Gear Teeth, 2nd Paper	G. H. Marx & L. E. Cutter	1494	.25	.40
Efficiency of Gear Driver	C. M. Allen & F. W. Rays	1641	.25	.35

No order filled for less than 50 cents

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Publication Sales Department: 29 West 39th Street, New York

Modern and Approved Appliances for the Transmission of Power

SHAFTING HANGERS
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COLLARS BELT TIGHTENERS
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ROPE DRIVE EQUIPMENTS

T. B. WOOD'S SONS CO.
CHAMBERSBURG, PA.

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Engineers Founders Machinists

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Transmission Machinery, Spun Silk Machinery, Ball Winding Machines, Shoe Lace Tipping Machines, Yarn Dressers, Wool Top and Yarn Baling Presses, Pneumatic Gravity Drop Hammers, Pneumatic Presses, Special Machinery, etc.

HARRIS-CORLISS STEAM ENGINES

Eastern Representative for

Cleveland Worm Gears and Worm Gear Reduction Units

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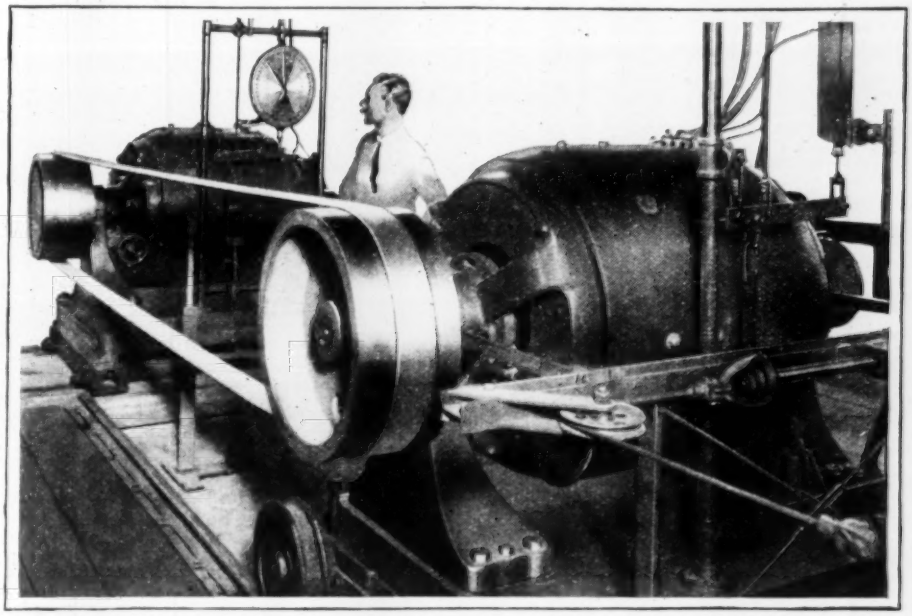

Photographed at The Leather Belting Exchange Foundation, Cornell University, where research work on power transmission is being carried on constantly in the interest of industry.

These tests show every plant owner how to save money on belting!

THE photograph above illustrates a test which means a great deal to every buyer of belting. It shows conclusively the comparative efficiency of all types of belts used for transmitting power.

Running under average shop conditions, a 100-H. P. motor drives a 100-H. P. dynamometer. Twenty different types of belts are used, one after the other, to transmit power. These belts are all 4 inches wide and 30 feet long. Each one is put on under the same tension—36 pounds per inch.

A power meter registers the power transmitted by each one. Another meter measures the percentage of "slip," or power lost.

These tests prove, beyond question of doubt, that a good leather belt delivers 40% more power, has a smaller percentage of slip, and a far higher operating efficiency than any other type of belting made.

For instance, assuming the rated capacity of a 4" leather belt to be 20 H. P., it will deliver 24 H. P., or 4 H. P. more than rated capacity, with only 1½% slip. *The best substitute of equal size usually delivers only 14 H. P. with the same percentage of slip.* On an overload, the leather belt ordinarily delivers 43 H. P. with 2½% slip, while a substitute usually gives only 16 H. P.—*less than the rated capacity of a leather belt of the same size.*

A leather belt delivers 40% and up more horsepower than a similar substitute belt. (Tests made at Cornell University, Mellon Institute and The Leather Belting Exchange Exhibits.)

These facts hold true with belts of any width or length—with any pulley ratio—and under any shop conditions. (Except that leather shows to even better advantage in most cases.)

Leather is not only more efficient—it is far more durable; has a high salvage value; can be made positively water-proof—and is, therefore, the most economical, dependable material on earth for transmitting power!

The results of these tests, together with other interesting information on power transmission, are combined in six valuable booklets. These will be sent you free upon request. They tell you how to choose the right kind of belting and how to care for it *to save money.* Simply sign and mail the coupon.

You are also invited to write us regarding power transmission problems. These, whenever possible, will be answered free of charge.

An Interesting Exhibit

The test illustrated above, with 10-H. P. machines and two-inch belts of all kinds, forms a part of The Leather Belting Exchange's exhibit at the

SECOND NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING

Grand Central Palace
New York City, N. Y.
December 3rd to
December 8th

Address—Research Division

THE LEATHER BELTING EXCHANGE, Forrest Building, Philadelphia

The Leather Belting Exchange is not a company operating for a profit or for selling belts. It was organized by the leading leather belting manufacturers of America in the desire to furnish impartial information on leather belting to manufacturers, engineers, and technical schools. It maintains a competent staff of experts in Philadelphia and at Cornell University who will gladly answer questions on power transmission without cost or obligation. In the broader interest of leather, it is affiliated with the leading Sole and Belting Leather Tanners in their nation-wide campaign on leather and the tanning industry. For information regarding leather, itself, address

AMERICAN SOLE *and* BELTING LEATHER TANNERS, 17 Battery Place, New York

Nothing takes the place of Leather

THE LEATHER BELTING EXCHANGE,
Forrest Building,
Philadelphia.

Please send me your six booklets on power transmission—FREE. Also, without obligation, place me on your mailing list for subsequent information developed by your research work on belting.

Name.....

Name of firm.....

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City..... State.....

Position held.....

We Recommend Our
POTOMAC BRAND STEEL

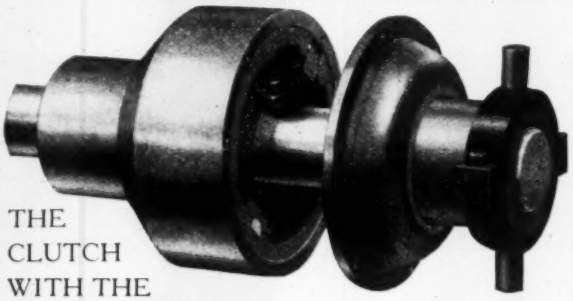
GROUND SHAFTS

for line shafting, lead screws, counter shafts, piston rods, arbors and all similar equipment. Ultimate strength about 80,000 lbs.; elastic limit about 42,000 lbs. Slightly higher in price, but economical because of saving in assembly cost and long service.

We can also furnish Ground Alloy Steel Shafts ultimate strength up to about 140,000 to 150,000 lbs.; elastic limit about 130,000 lbs. to 140,000 lbs.

CUMBERLAND STEEL CO.
CUMBERLAND, MD.

THE
CLEVELAND
FRICTION CLUTCH



THE CLUTCH WITH THE VELVET PICK-UP

It's the easy pick-up that prolongs the life of the CLEVELAND and the machine it operates. It releases instantly. Fully enclosed and running in oil. Made in clutches and cut-off couplings in sizes ¾ H. P. up.

Ask for Bulletin 100

WESTERN ENGINEERING & MFG. CO.
362 EAST GRAND AVENUE
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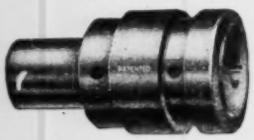
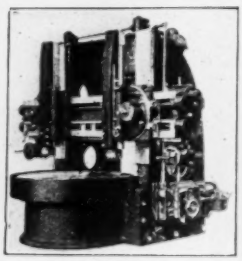
THE JOHNSON FRICTION CLUTCH

AS USED ON THE
"NEW" TYPE COLBURN HEAVY DUTY VERTICAL BORING MILLS



SIX JOHNSON FRICTION CLUTCHES ON EACH

Single Clutch, Exterior



Here is Proof of the Value of Johnson Clutches on Machinery.

Let us tell you about its application to your machine.

Courtesy Colburn Mach. Tool Co., Cleveland, Ohio.

Write for Catalog "C"

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SPECIALIZED CONSULTING SERVICE
In ALL BRANCHES of the ENGINEERING FIELD

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Power Transmission
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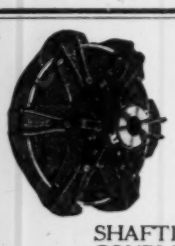

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POWER TRANSMISSION APPLIANCES

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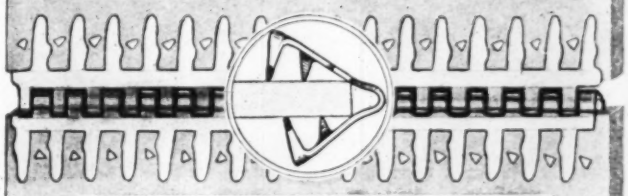


FOR UNIVERSAL SERVICE

In light machine drives whether slow, medium or high speed, a joint of Alligator Steel Belt Lacing properly applied is safe and long lasting. Recommended also for heavy drives and for use with idlers, on mule and serpentine drives, flat conveyors, or for tape and extra light drives. It combines the essentials demanded of modern belt joint: strength, smoothness, flexibility and simplicity of application.

A universal joint for universal service—gives universal satisfaction.

FLEXIBLE STEEL LACING COMPANY
4695 Lexington St., Chicago, Ill.
In England at 135 Finsbury Pavement, London, E. C.2

"Every Tooth A Vise"

For Every Size and Kind of Belt

Just Issued

Test Code for Hydraulic Power Plants and Their Equipment

Invaluable to those interested in the testing of Hydraulic Power Plants

This Code is the first of a series of sixteen test codes to be issued during the coming year by the A.S.M.E. Committee on Power Test Codes as a result of its years of work on the revision of the Power Test Codes of 1915.

The tests referred to in this code relate either to the entire plant, extending from head water to tail water, or any elementary part or parts of the plant. A section on the instrument and apparatus which are referred to in the code forms an important part to this code.

Price—80c. *a copy (to members* 70c.) *In quantities of* 25 *or more* 65c.

Date.....

PUBLICATION-SALES DEPARTMENT,
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS,
29 West 39th Street, New York City.

Gentlemen:

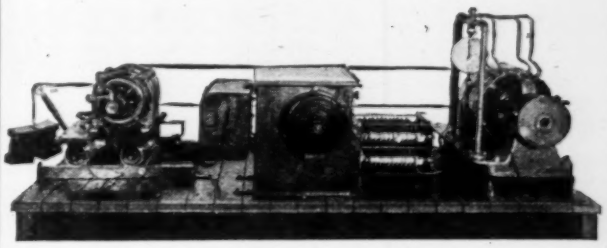
Please enter my order for copies of the new A.S.M.E. Code as indicated below.

☐ Test Code for Hydraulic Power Plant and Their Equipment. Price—80c. a copy (to members, 70c).

Name .....
Address .....

M E. 12-23

Nothing takes the place of Leather



Leather Belting at the Second National Exposition of Power and Mechanical Engineering

THE photograph above illustrates a test which means a great deal to every buyer of belting. It shows conclusively the comparative efficiency of all types of belts used for transmitting power.

Running under average shop conditions, a 10-H. P. motor drives a 10-H. P. dynamometer. Twenty different types of belts are used, one after the other, to transmit power. These belts are one and two inches wide, each the same length. Each one is put on under the same tension, in order to secure an actual comparison of power transmission ability.

A power meter registers the power transmitted by each one. Another meter measures the percentage of "slip," or power lost.

These tests form an actual demonstration of how a belt—whether a leather belt or a substitute belt—transmits power. Ingenious devices show the percentage of slip, arc of contact, pully grip and other characteristics of each belt, which are of the utmost importance to you in solving your transmission problems.

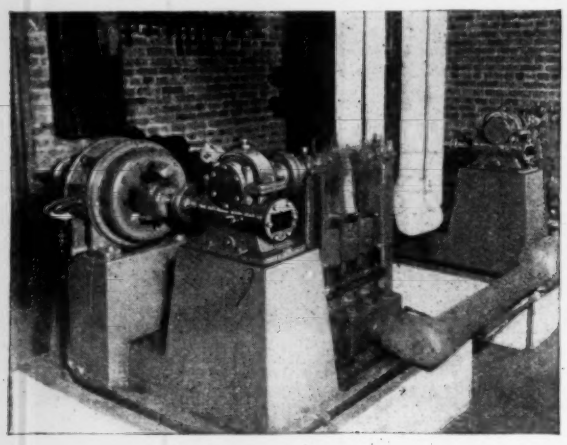
Other tests show the steps required to make a leather belt endless inside the shop. And also, the efficient operation of a leather belt under water.

A visit to the exhibit will prove well worth your while from a purely educational standpoint alone.

These tests will be shown at the exhibit of The Leather Belting Exchange at the Second National Exposition of Power and Mechanical Engineering, December 3-December 8.

All who are interested in belting will be cordially welcome. You are also invited to write us regarding power transmission problems. Wherever possible we will advise you free of charge.

THE LEATHER BELTING EXCHANGE
Forrest Building, Philadelphia



Cleveland Worm Gear Reduction Unit operating pump. Motor 1½ H.P. at 810 R.P.M. Ratio in worm drive 25 to 1.

Are you familiar *with these advantages?*

The advantages of Cleveland Worm Gear Speed Reduction Units should be known to every engineer. We repeat them below:

1. High efficiency
2. Low cost of upkeep
3. Smooth, even flow of torque
4. Freedom from vibration
5. Greater compactness
6. Ability to handle abnormal gear ratios with ease
7. Positive lubrication
8. Positive simplicity
9. Maximum silence in operation
10. Permits standardization of motor speeds.

Unusually large ratios may often be handled through Cleveland Worm Gear Reduction Units in one set of gears.

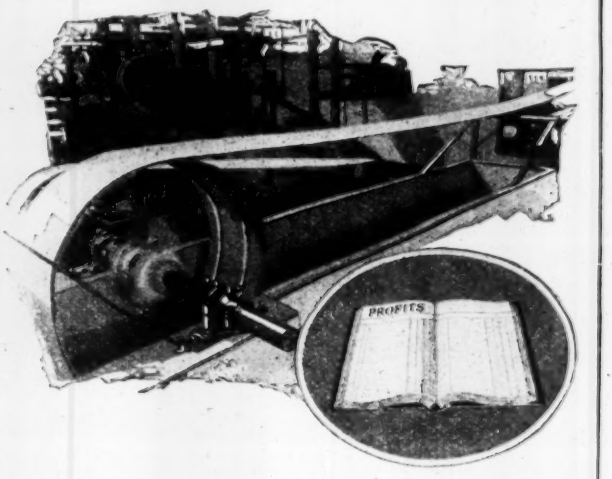
We recommend them on the basis of permanently satisfactory service. Our engineering department is always glad to cooperate with yours.

Don't settle your speed reduction problem until you have given due consideration to the facts listed above and then get in touch with us for further information.

The Cleveland Worm & Gear Co.
America's Worm Gear Specialists
CLEVELAND, OHIO

Cleveland
WORM GEAR REDUCTION UNITS

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment



We must respect the facts

Business today is bending every effort to keep the overhead down.

Boards of strategy meet and lop off expenses right and left.

Power equipment in particular is checked at every turn of the wheel and only units of proven value are kept in place.

RESULT:

Goodrich is enjoying the largest demand in its history for Goodrich Commander Transmission Belts.

THE B. F. GOODRICH RUBBER CO.
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Goodrich
Commander
TRANSMISSION BELTS

"Best in the Long Run"

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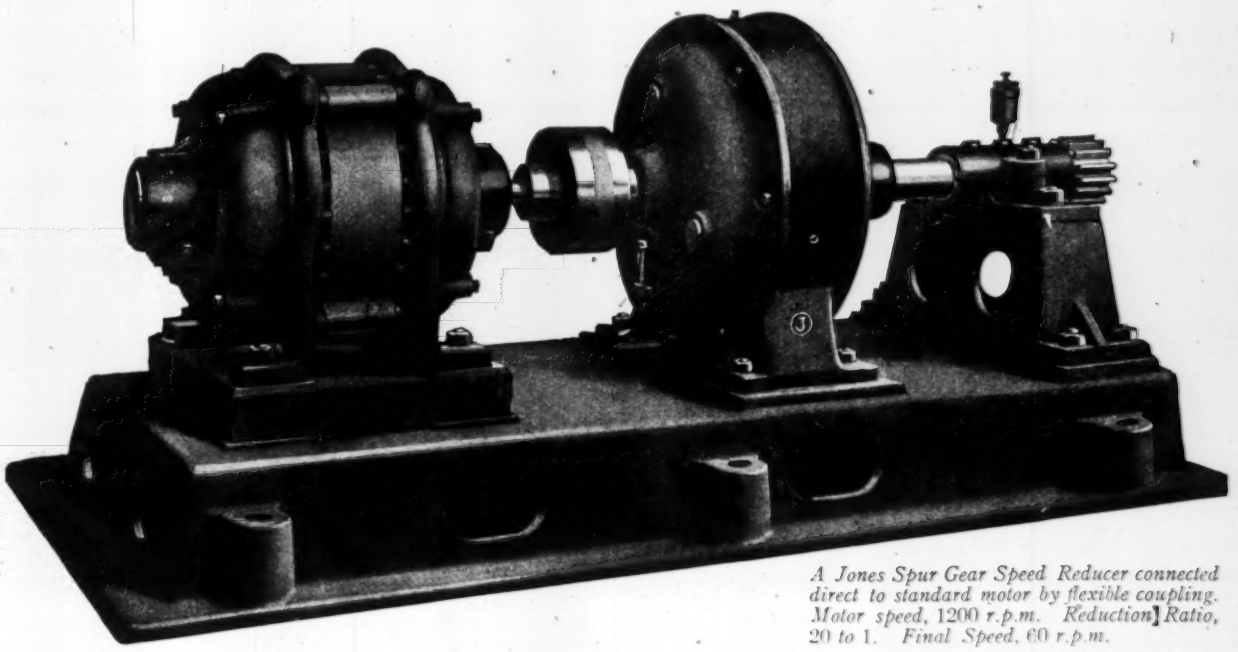
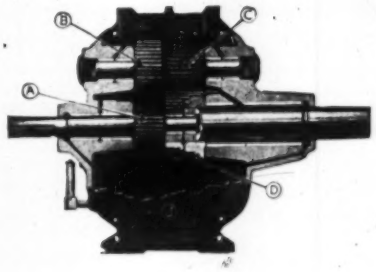


A Jones Spur Gear Speed Reducer connected direct to standard motor by flexible coupling. Motor speed, 1200 r.p.m. Reduction Ratio, 20 to 1. Final Speed, 60 r.p.m.

The Jones Spur Gear Speed Reducer Effects Economy in Driving Machinery



A—Pinion meshes with and drives three gears, *B*.

B—Gears are mounted integral with three pinions, *C*.

C—Pinions mesh with and drive slow speed gear, *D*.

Let us assume that a standard motor is purchased to drive a machine at a given speed.

To reduce the speed of the motor to the speed of the machine, *speed reduction appliances* are also required. These often consist of belts, chains, shafts, pulleys, or gears. They represent a perishable outlay, demanding frequent attention, each unit of which (the pulley, shaft, belt, etc.) is independent of the other.

Why not install one—*complete reduction unit*, mounted on the same base as the motor, which will reduce speeds in ratios as high as 200 to 1, and which demands no attention other than an occasional oiling?

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Jones

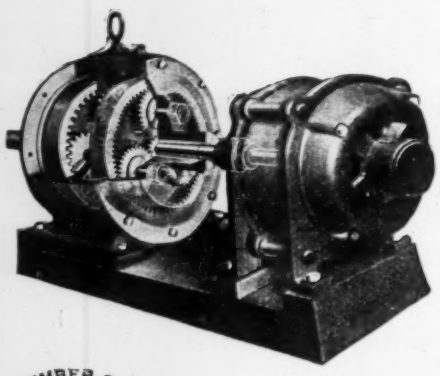
MEMBER OF AGMA

Spur Gear SPEED REDUCERS

J-177

FOOTE SPEED REDUCER TRANSMITTING POWER FROM MOTOR TO HEAD DRIVE AT ATLANTIC ELEVATOR, CHICAGO

Foremost Engineers Approve FOOTE SPEED REDUCER Engineering & Construction



When the engineers of such companies as Ford Motor Co., Snoqualmie Falls Lumber Co., Indiana Portland Cement, Atlantic Elevator, Republic Chemical Co., Durant Motors, and innumerable others equally well known choose FOOTE SPEED REDUCERS it is a high recommendation. It assures you that when you make FOOTE SPEED REDUCERS your choice for reducing the speed of your motors and transmitting the power to your conveyors, mixers, agitators, etc., you are choosing wisely.

FOOTE SPEED REDUCERS replace belting, chains, open gearing—creating greater production efficiency and worth while economy.

MEMBER OF AGMA

FOOTE ENGINEERING SERVICE

Perhaps your plant can be put on a basis of greater efficiency and better economy. Our engineers will be pleased to determine whether this can be done—without obligation to you. Write us now.

FOOTE BROS. MACHINE GEAR & CO.

248-258 N. Curtis St. — *Mfrs. of bakelite micarta pinions and cut gears of all kinds. Send for catalogue.* — **Chicago, Ill.**

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San Francisco, Cal.

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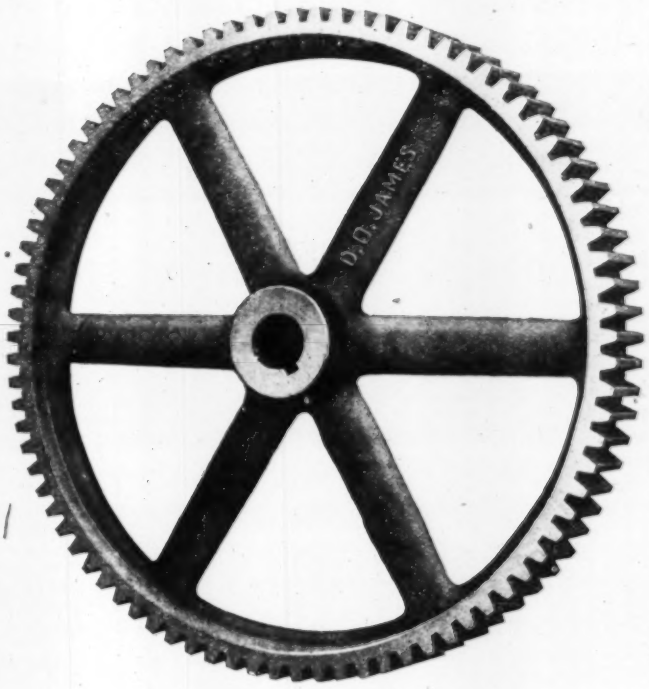


JAMES GEARS

A GEAR to us is something more than just a gear. It is a product by which our reputation stands or falls.

We have facilities for making all types and sizes of cut gears, and have refined production methods so that prompt delivery is assured. The manufacture of gears receives the same careful attention as James Speed Reducers, and none leaves our factory that is not exactly according to specifications.

Try James service on cut gears. Let us have your next inquiry.

The D. O. James Manufacturing Co.

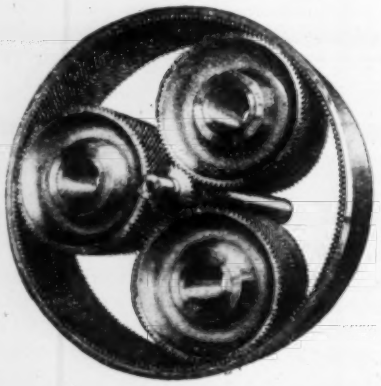
1120 W. Monroe St., Chicago, Ill.

Manufacturers of
Spur and Worm Gear Speed Reducing Transmissions,
Spur, Bevel, Mitre, Worm, Internal, Helical and Tractor Gears.
Rawhide and Bakelite Pinions—Racks.

D.O.JAMES

11

The Turbo Gear Will End Your Transmission Problem



Beyond doubt it is the ideal reduction gear for increasing or reducing the speed of your fan, pump, turbine, compressor or other equipment. Maintains axial alignment and insures perfect balance. Entirely self contained and very compact. Forced lubrication minimizes friction and wear. Cool and quiet operation assured.

Furnished in ratios from 3:1 to 15:1 any capacity up to 1500 HP depending on speeds.

Send for your copy of our bulletin No. 103 which fully describes the Turbo Gear and its application.

Write for our recommendations to suit your requirements.

Poole Engineering & Machine Company

Manufacturers of Power Transmission Machinery Since 1843

Main Offices & Works **BALTIMORE, MD., U. S. A.**

See Our Data in 1923-24 A.S.M.E. Condensed Catalogues of Mechanical Equipment

MEDART

Gearing

Spur, Bevel, Mitre, Internal, Worm, Mortise—all styles. Wood Cogs.

Medart Gears are made in every type—of any material—either pattern-molded, machine-molded or cut. **Gears cut up to 72 inches diameter.**

Medart patterns are unusually complete—prices attractive—service prompt. Send for our new Catalog No. 43 or submit your specifications for our engineers' estimate.

The Medart Company

(Formerly Medart Patent Pulley Co.)

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More extended information on various Medart products is contained on page 251 of the 1923-24 A.S.M.E. CONDENSED CATALOGUES.

MEDART means EVERYTHING in LINE SHAFTING EQUIPMENT

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If you desire capital or have it to invest; if you have a patent for sale or development; if you have on hand used machinery for disposal, or if you want such equipment; if you have copies of publications, or a set of drawing instruments to dispose of; in fact, anything to be offered that somebody else may want, or anything wanted that somebody else may have—use a classified advertisement in the Opportunities Section in MECHANICAL ENGINEERING for quick results.

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ENCLOSED GEAR DRIVES
FLEXIBLE COUPLINGS

SPECIAL MACHINERY

CUT SPUR = CUT BEVEL = CUT WORM = GEARING

FAWCUS MACHINE CO. Pittsburgh, Pa.

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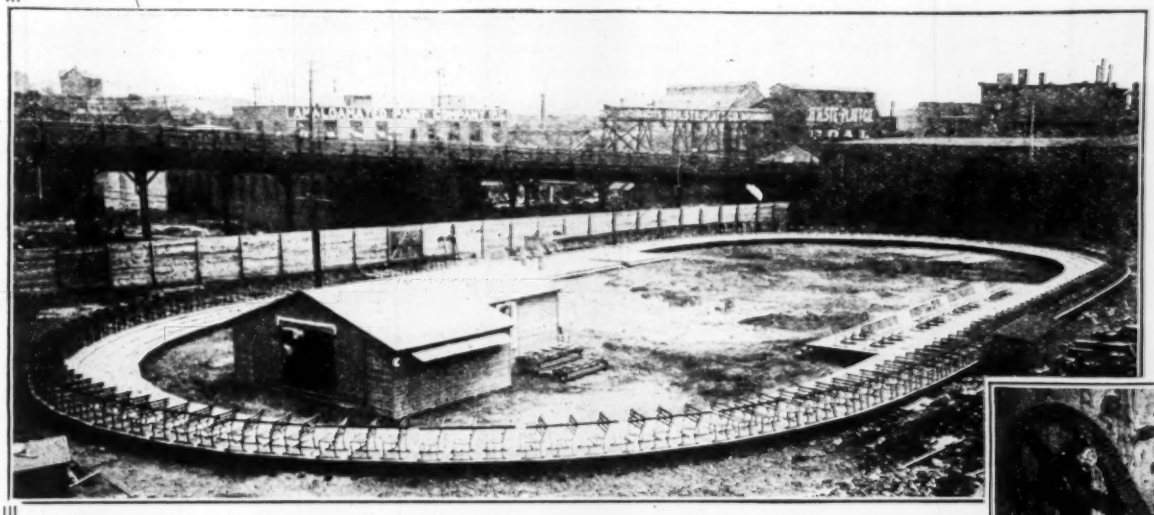
A NEW MEANS OF RAPID TRANSIT

This Moving Walk is designed to replace subway "shuttle" trains and similar short run equipment in underground city traffic. There are three narrow platforms running at three, six and nine miles an hour arranged in a continuous loop that affords transit in either direction. A continuous walk inside the low speed platform permits access at any point.



This plant is now in operation at Jersey City and is driven by an electric motor through a

"WHITNEY"
LONG SERVICE CHAIN
SILENT TYPE

as shown by the small illustration at the right. In a drive of this kind it is imperative to secure long life combined with a certainty of continuous operation day in and day out with no likelihood of skipping the sprocket teeth. Therefore, the "WHITNEY" Long Service Chain was selected.

The Engineering Department of the Whitney Mfg. Co. is always at your disposal to consider and make suggestions on any possible application of chain drives.

The Whitney Mfg Co., Hartford, Conn.

CHAINS · KEYS AND CUTTERS · HAND MILLING MACHINES

NEW YORK	BOSTON	PHILADELPHIA	SAN FRANCISCO	SEATTLE
L. C. Biglow & Co., Inc.	George C. Steil	R. J. Howison	A. H. Coates Co.	A. H. Coates Co.
243 W. 55th St.	740 Commonwealth Ave.	624 Race St.	770 Mission St.	1115 E. Union St.

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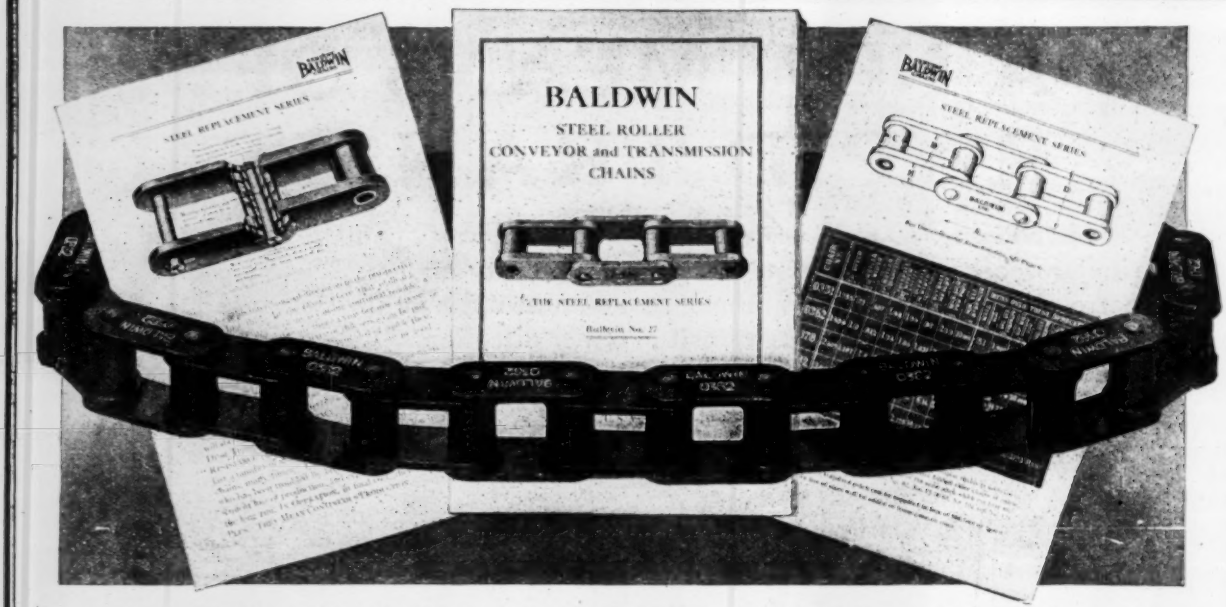


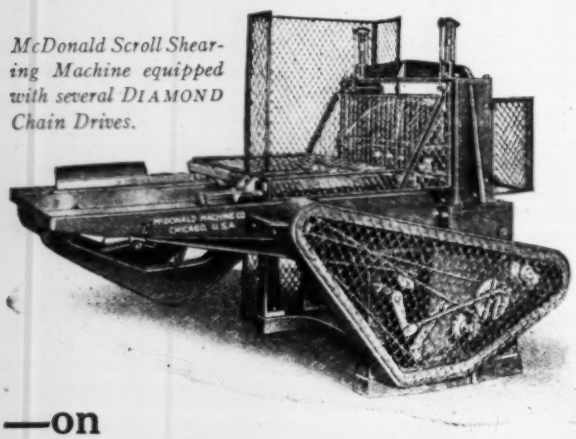
BALDWIN CHAINS and SPROCKETS will bring continuous Production in Your Plant

If you are striving to attain Continuous Production in your particular line, whether it be Lumber, Steel, Paper, Textile, Cement, Oil, Coal or a hundred others that we might mention, then you are vitally interested in—BALDWIN'S New Steel Replacement Series of CHAINS. They run over the same Sprockets as Popular Sizes of Malleable Detachable Chains.

The new Bulletin No. 27 will be sent you on request, and our Engineers are ready to help you apply the chain to your particular problem.

BALDWIN CHAIN & MANUFACTURING COMPANY, Worcester, Mass.

H. V. GREENWOOD, *General Western Representative* PEOPLES GAS BUILDING, CHICAGO, ILL.



McDonald Scroll Shearing Machine equipped with several DIAMOND Chain Drives.

—on Can-Making Machinery

Year after year the McDonald Machine Company of Chicago, well-known manufacturers of tin-working machinery, have found DIAMOND Chains the best answer to the power-transmission requirements of their products.

DIAMOND Chains will meet your requirements just as well as they serve many other manufacturers and users of machinery. Our engineers will be glad to show how a DIAMOND Chain Drive will give better results and cost less per year of service. Write for our booklet "Chain Drive Data"

DIAMOND CHAIN & MFG. CO. Indianapolis, U.S.A.

Makers of High Grade TRADE MARK *Chains Since 1890*

DIAMOND Roller Chains

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ONE of the largest collections of engineering literature in the world is that found in the Engineering Societies Library, 29 West 39th Street, New York.

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"The Chain of Double Life"

For standard cast tooth sprockets No. 35 to 6 in. pitch
For cut tooth sprockets 1 in. to 2 in. pitch.

UNION STEEL RIVETLESS CHAINS

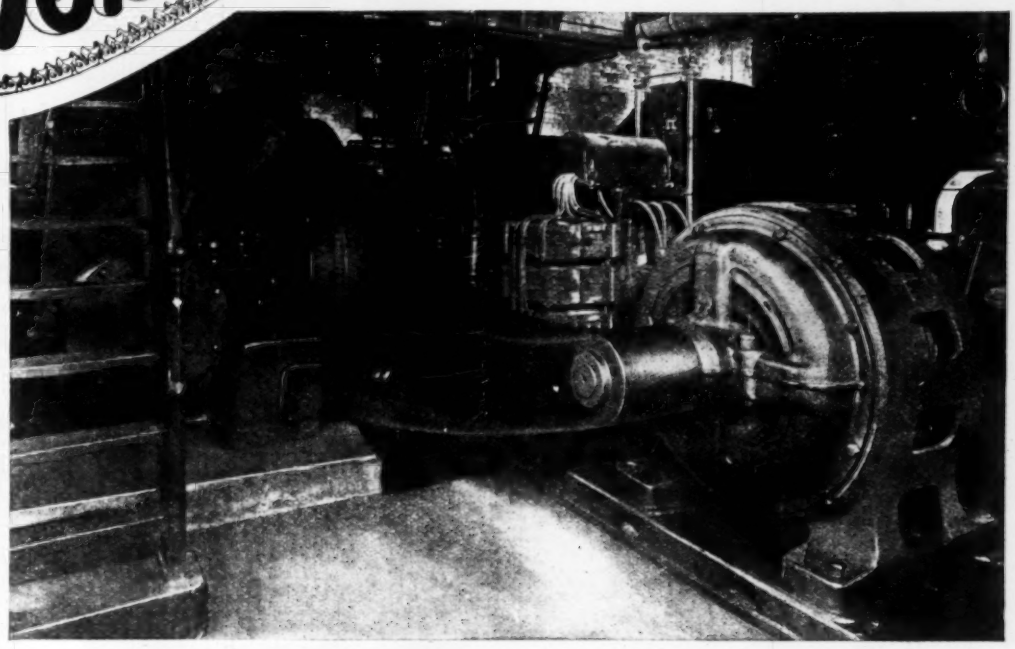
The Chains with the Substantial Links and Large Case-Hardened Bearings, which are reversible and renewable.

Roller Chains, Bushing Chains, Attachment Links, Cast Tooth Sprockets, Cut Tooth Sprockets, Elevating and Conveying Machinery.

Special Transmission Chains up to 1,000,000 Pounds Ultimate Strength

The Union Chain & Mfg. Co., Sandusky, O.

MORSE SILENT CHAIN DRIVES



Morse Silent Chain Drive in action, at the Greenwald Packing Corporation plant, Baltimore, Md. Driving from motor to 90 ton refrigerating machine. Motor speed 480 R.P.M. Machine speed 108 R.P.M. Motor H.P. 150. Width of chain 13 in. Center distance 10 ft.

To Get Efficiency

"To get efficiency"—is the terse reason why Morse Silent Chain Drives were selected, says Mr. C. Heron, C. E. of The Greenwald Packing Corporation, Baltimore, Md.

Mr. Heron is in a position to know, for in addition to this drive, there are four other Morse Silent Chains on elevator drives, installed in 1906 and "still going good."

* * * * * *

Efficiency is always a factor. Efficiency in transmitting power. Efficiency in requiring practically little attention. Efficiency in terms of long useful, year after year, trouble-free service.

Morse Silent Chain Drives transmit 98.6% of the developed power. Sustain this very high rate throughout the life of the Drive. In addition, provide positive speed ratio between driver and driven; save valuable space by using short centers. Run quiet, cool and clean. Have long life with low upkeep and maintenance costs.

"To get efficiency," capable transmission engineers will gladly assist you.

MORSE CHAIN CO., ITHACA, N. Y.

There is a Morse Engineer near you

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CHICAGO, ILL. . . . . Room 803, West Adams St.
CLEVELAND, OHIO. . . . . 421 Engineers Bldg.
DENVER, COLO. . . . . 1761 Wazee St., R. M. Parsons
DETROIT, MICH. . . . . 7601 Central Avenue
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MONTREAL. . . . . St. Nicholas Bldg., Jones & Glassco, Reg'd.
PHILADELPHIA, PA. . . . . 612 Franklin Trust Bldg.
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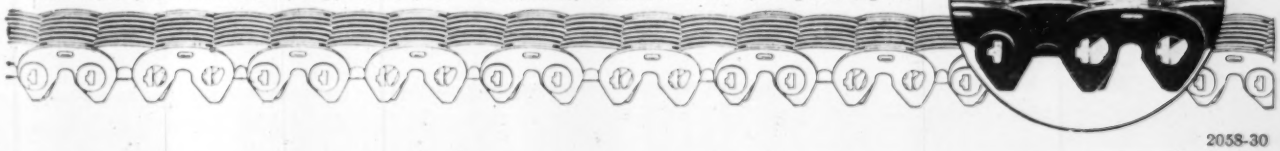

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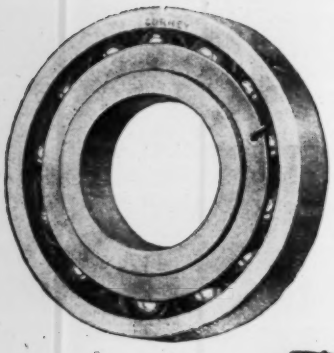

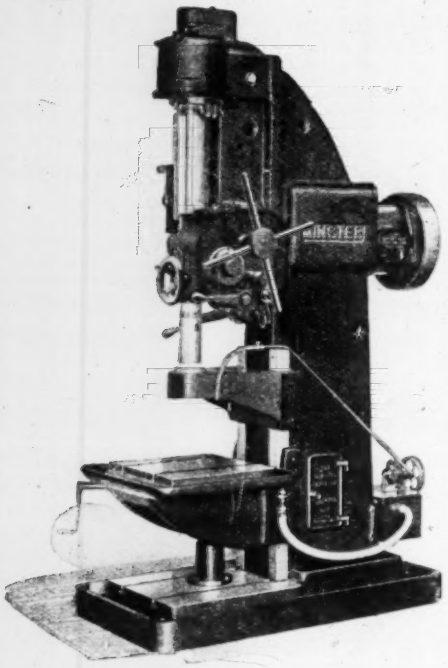

Minster Hi-Duty Drill

No part of a high speed, hard working, Hi-Duty Drill is more important than the transmission. After careful consideration of the severity of their requirements, Minster Engineers selected Gurney Ball Bearings for the entire transmission.

The unusually high load capacity of Gurney Ball Bearings, together with their ability to withstand shocks and overload through long and continuous service makes them particularly well suited for an installation of this difficulty.

Let our engineers help you.

GURNEY BALL BEARING CO.
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JAMESTOWN, N. Y.

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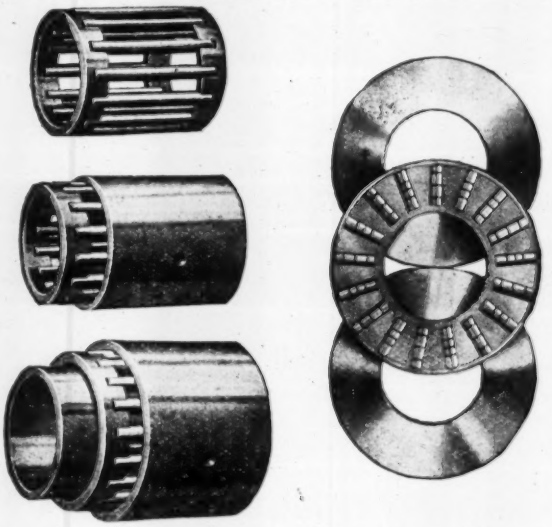
GURNEY
BALL BEARINGS



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HEAVY DUTY
STANDARD SIZES OR TO ORDER
3/4" UP TO 12" SHAFT DIA.
One or—One Thousand

THE GWILLIAM COMPANY

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Just Issued

Rules for the Construction of Low-Pressure Heating Boilers

To keep pace with the important recent developments in the low-pressure heating boiler field, the Boiler Code Committee has just completed an entire revision and rewriting of the Heating Boiler Section of the 1918 Edition of the Boiler Code. The revised Code constitutes section IV of the 1923 Edition of the A.S.M.E. Boiler Code and in order to more adequately provide for the divergent classes of heating boiler construction, it is divided into separate sections for low-pressure steel plate and for cast-iron boilers. The steel plate section embraces an important innovation in the form of special rules for the construction of low-pressure boilers with welded joints.

Price—80c a copy (to members 70c).
In quantities of 25 or more 65c.

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THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS,
29 West 39th Street, New York City.

Gentlemen:

Please enter my order for copies of the new A.S.M.E. Code as indicated below.

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Strom service is as good as we know how to make it. We have studied what manufacturers need. And we have adapted our service to their needs.

On orders for ball bearings from stock we can frequently make shipments the same day the order is received.

Where technical advice is needed, our corps of experts is at your service. They are familiar with every type of ball bearing installation ever made. We will be pleased if you will call on us.

Our interest in our installations continues long after we have made delivery. We are concerned with the successful operation of our bearings throughout their lives.

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Double-acting thrust bearing, flat seats (grooved races) 2100-F Series

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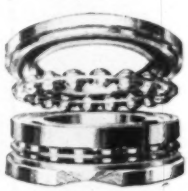
Single-acting, self-aligning thrust bearing 1100 Series

Single-acting, self-aligning thrust bearing, leveling washer, 1100-U Series



Double-acting, self-aligning thrust bearing, leveling washers 2100-U Series

Single-row deep-groove Standard type, radial bearing

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Angular contact bearing, combination radial and thrust

Double-row, maximum type, radial bearing

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Strom BALL BEARINGS

"Wherever a Shaft Turns"

U. S. BALL BEARING MFG. CO.

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Trolleys, cranes, hand hoists, electric hoists—all overhead handling equipment becomes Better Handling Equipment when operating on Hyatt roller bearings.

Better Handling Equipment transfers loads easily, dependably and economically, the bearings—Hyatt roller bearings—last throughout the life of the equipment without adjustment or replacement.

Better Handling Equipment will cut your handling costs—specify Hyatt roller bearings and secure these economies.

Hyatt Roller Bearing Company

Newark Detroit Chicago San Francisco

Worcester Milwaukee Huntington Minneapolis
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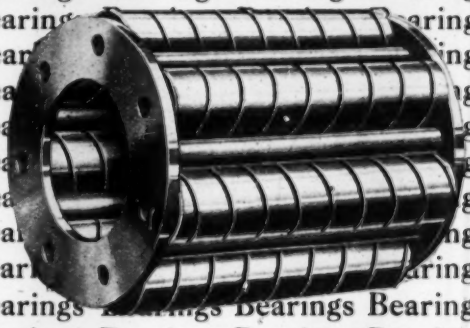

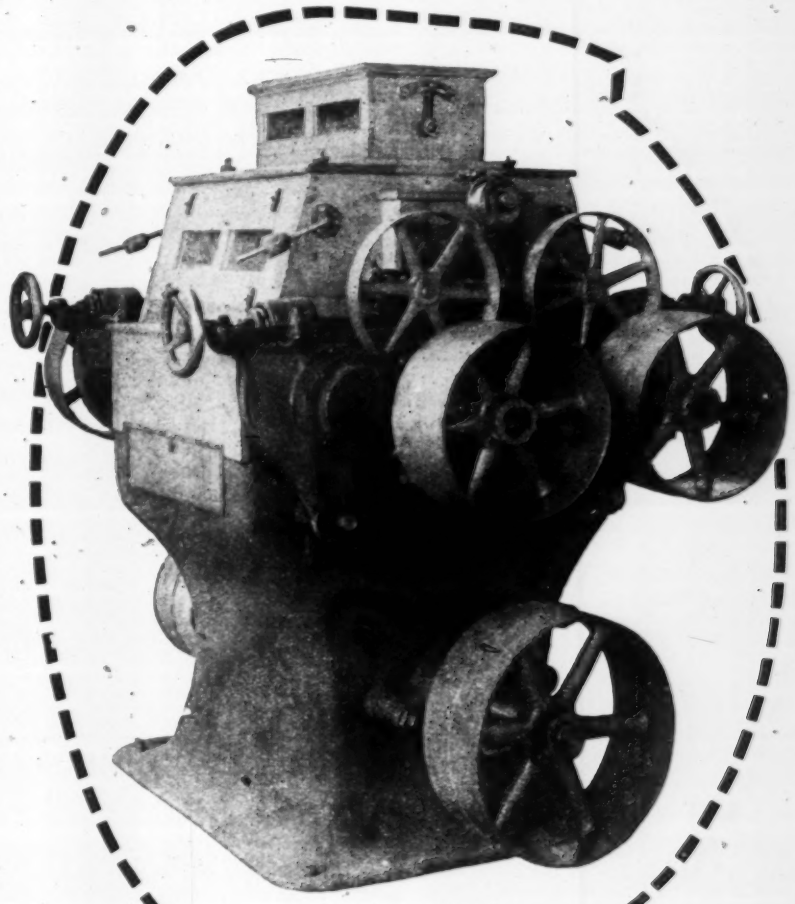

Timken-equipped Allis-Chalmers Flour Mill

20% Power Saving

TIMKEN
Tapered
ROLLER BEARINGS

Every one of the many desirable performance characteristics found in the flour mills built by the Allis-Chalmers Mfg. Co., of Milwaukee, Wis., is enhanced in profit-making capacity by the use of Timken Tapered Roller Bearings on the rolls.

Allis Mills always have been noted for their uniform grinding ability, rigidity, long life, and simple adjustability.

The use of Timken Bearings in self-aligning boxes now assures Allis performance with materially lessened power consumption; with the elimination of the oiling bugbear; with the initial starting torque greatly reduced; and with still further provision for adjustment against the wear that *must* always follow motion.

Actual tests show the Static Starting Torque of an Allis Roller Mill, Timken Equipped, to be only 73¼ lbs. as against 218½ lbs. with Collar Oiling equipment. The same tests show at least 20% in operating power saved in the Timken equipped mill.

The rugged capacity of Timken Bearings with their simple adjustability provides a mill in which uniform grinding, with longest possible unbroken runs, is assured for the greatest possible length of life.

The Timken Roller Bearing Co
CANTON, OHIO

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We grind the feet of *Royersford* Universal Hangers

—no troublesome shimming

Royersford Universal Hangers are always at right-angles with the shaft.

Another feature of these Royersford Hangers is the *broken joint.*

After each hanger has been cast the yoke is broken so that an uneven surface will result. This insures the yoke against slipping or turning after the bearing and shaft are in place and it has been bolted to the frame. The frame itself is double-ribbed, there being one rib inside and one outside.

Royersford Universal Hangers will accommodate all types of bearings—roller, ball and babbitted.

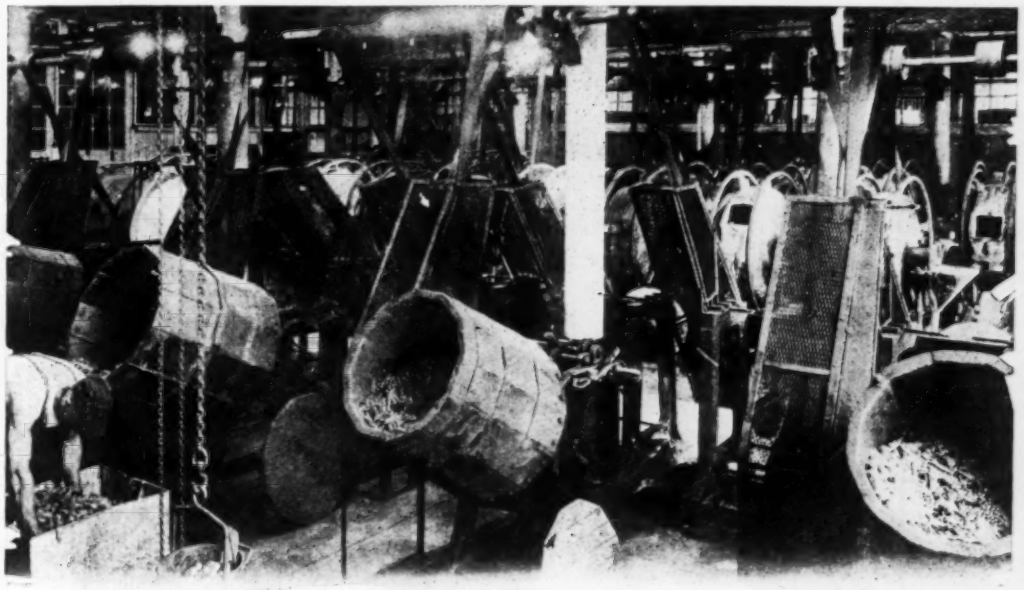
Royersford dealers can make immediate delivery of these hangers.

For dealer nearest to you see Mac-Rae's Blue Book.

Royersford Foundry & Machine Co.
60 N. 5th Street, Philadelphia, Pa.

A cast iron hanger for rigidity

ROYERSFORD Universal Hangers



Days are Consumed in Removing .0002 inch From Atlas Balls in Polishing and Burnishing

AS EACH batch of Atlas Balls go to the polishing department a few sample balls are measured on Minimeters to determine their exact size. In this way the amount of material — generally about .0002 inch — that should be removed in polishing is made known, permitting the length of the polishing operation to be set accordingly.

The polishing operation consists of tumbling the balls very slowly but continuously for from 20 to 40 hours in barrels containing Vienna lime and water. Upon being removed the balls are dried in saw dust and then rolled for several hours in wood tumbling barrels containing strips of soft kid leather which give to the balls their exceptionally brilliant finish.

The finished balls which are true in size and sphericity to within plus or minus of 1 2 of 1 10,000 inch, are then surface inspected and gauged. Nothing is taken for granted. That is one of the reasons why Atlas Balls are noted for being unsurpassed in accuracy, quality and endurance.

Hultgren **BRINELL BALLS** Process

The development of a new ball for Brinell Testing Machines—combining uniform and greater hardness with extreme accuracy—has been completed. Balls made by this process are now available.

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ALSO BRASS, BRONZE, MONEL AND SPECIAL METALS

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Fafnir Ball Bearings possess many distinctive advantages, among which are the following:—

1. **High carbon chrome alloy steel,** resulting in combined hardness and toughness.
2. **Thorough heat treatment,** and not case hardening which is only skin deep.
3. **Turned Balls,** insuring absolute uniformity and resistance to wear.
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5. **Pressed steel ball retainer,** which is practically destructionless and frictionless.

Fafnir Ball Bearings are manufactured in all standard types and sizes. There's a Fafnir for every bearing purpose.

THE FAFNIR BEARING COMPANY

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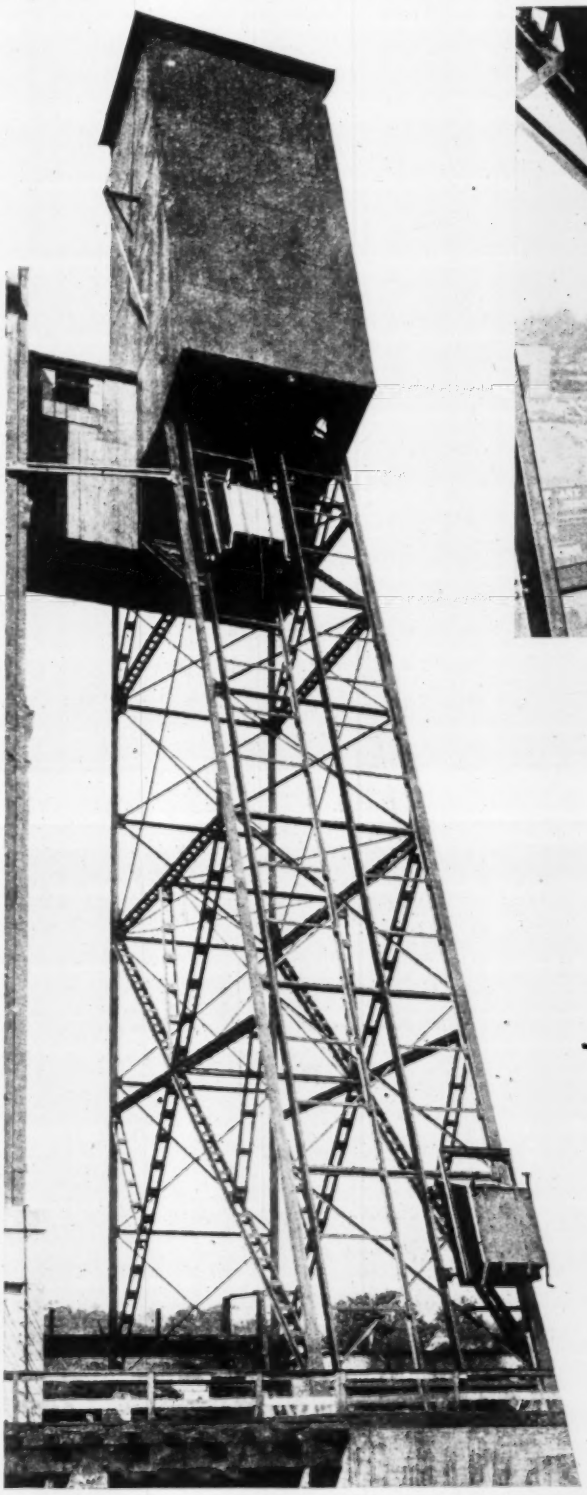

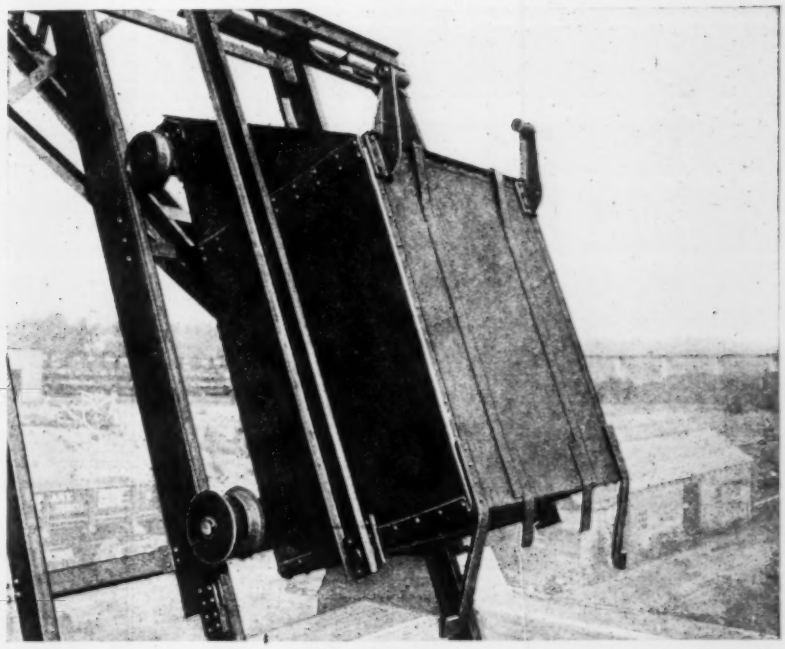

The Skip Hoist
For Handling Coal

HERE is an effective coal handling equipment—a Link-Belt Skip Hoist. It is used by the American Construction & Securities Co., Williamsport, Md., to take coal to the horizontal conveyors which deliver to the coal bunkers.

The Link-Belt Skip Hoist represents more than twenty years experience in building this type of equipment.

Like some other types of material-handling machinery, it is better suited to certain conditions than elevators and conveyors of the chain-and-bucket type.

We build, in their entirety, at our own plants, all the approved types of conveying equipment. Our plans therefore are made without prejudice and include the Peck carrier, belt conveyors, bucket elevators and conveyors, coal crushers, power hoes, locomotive and crawler cranes, bins, chutes and all equipment for handling coal and ashes.

Let our experienced engineers show you how you can save time, labor and money by handling your coal with modern Link-Belt machinery.

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"We have five two-drum hoists of your make in use at this time and as fast as our other equipment wears out, we expect to replace it with Clydes. We are very well pleased with the performance of your machines and the service rendered by your company. JOHN FINN & SON, B. L. Bailie, Gen. Mgr."

You will find ECONOMY and DEPENDABILITY built into EVERY UNIT of the CLYDE Line

You'll take pride in your CLYDE!

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BLOW 4,000 Ft.

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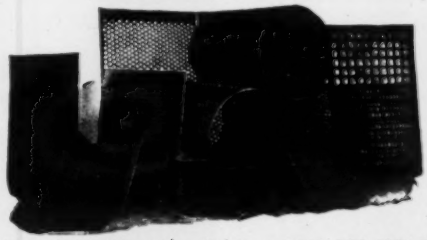
HENDRICK SCREENS
for every purpose



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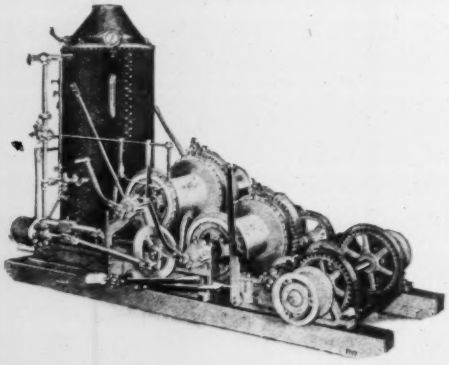
STEAM - ELECTRIC - GASOLINE



HOISTS IN SIZES AND TYPES TO MEET EVERY HOISTING DUTY

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WIRE ROPE
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—are manufactured up to a standard and not down to a price.

The reason why Roebling Products are so universally demanded is simply because they give satisfaction in the various lines in which they are used.

John A. Roebling's Sons Co., Trenton, N. J. Makers of Wire Rope and Wire

Roebling Wire Rope used successfully since 1840.

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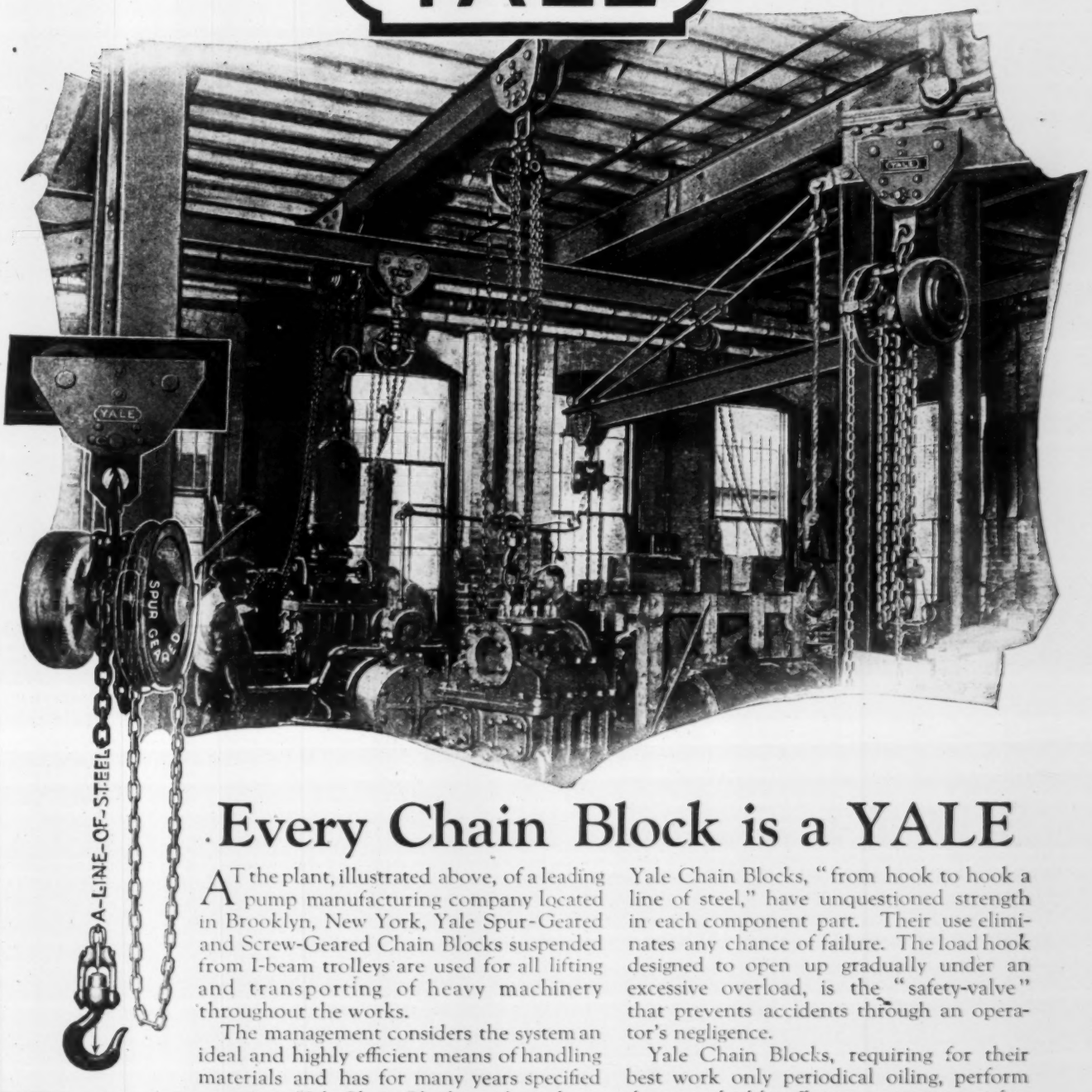
TRADE YALE MARK



Every Chain Block is a YALE

AT the plant, illustrated above, of a leading pump manufacturing company located in Brooklyn, New York, Yale Spur-Geared and Screw-Geared Chain Blocks suspended from I-beam trolleys are used for all lifting and transporting of heavy machinery throughout the works.

The management considers the system an ideal and highly efficient means of handling materials and has for many years specified Yale Chain Blocks exclusively.

Of the utmost importance in this, as in all other installations, is the question of safety. Yale Chain Blocks, "from hook to hook a line of steel," have unquestioned strength in each component part. Their use eliminates any chance of failure. The load hook designed to open up gradually under an excessive overload, is the "safety-valve" that prevents accidents through an operator's negligence.

Yale Chain Blocks, requiring for their best work only periodical oiling, perform the same highly efficient service year after year.

Service considered, Yale equipment is decidedly a good investment.

YALE

Chain Blocks, Electric Hoists } For Lifts

I-Beam Trolleys, Industrial Trucks } For Shifts

The Yale & Towne Manufacturing Co.

Makers of Yale Products: Locks, Door Closers and Material Handling Equipment

Stamford, Conn., U. S. A.

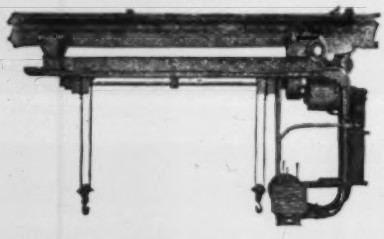
Yale Made is Yale Marked

YALE Hoisting and Conveying Systems

NORTHERN CRANES AND HOISTS

Our Electric Traveling Cranes, Electric and Air Hoists and Mono-Rail Systems will help solve the problem of handling expense by substituting profit for wasteful wages.

Have you such problems?



NORTHERN ENGINEERING WORKS
DETROIT, MICHIGAN

The New EVEREDY Electric Hoist

LIGHT WEIGHT

QUICK SPEED

READING CHAIN & BLOCK CORP., READING, PA.

CRANES

FOUNDRY EQUIPMENT
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HARVEY-ILL. U.S.A.
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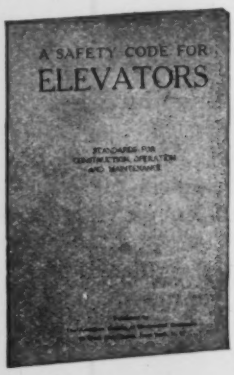
A SAFETY CODE *for* ELEVATORS

Since 1916, the Committee on Protection of Industrial Workers in cooperation with a large group of specialists has been at work on the formulation of this code. A tentative draft presented to the Society at the Spring Meeting of 1920 was widely discussed. The criticisms and suggestions received at that time were very carefully considered by this Committee and the Society is now able to publish the completed code.



For all those having to do with elevators this code is invaluable since it covers the construction, operation and maintenance of elevators, dumbwaiters and escalators.

The Code has seven sections:

1. Hoistway Construction for Passenger and Freight elevators and for Dumbwaiters.
2. Power Passenger Elevators
3. Power Freight Elevators
4. Hand Elevators and Hand Invalid Lifts
5. Dumbwaiters
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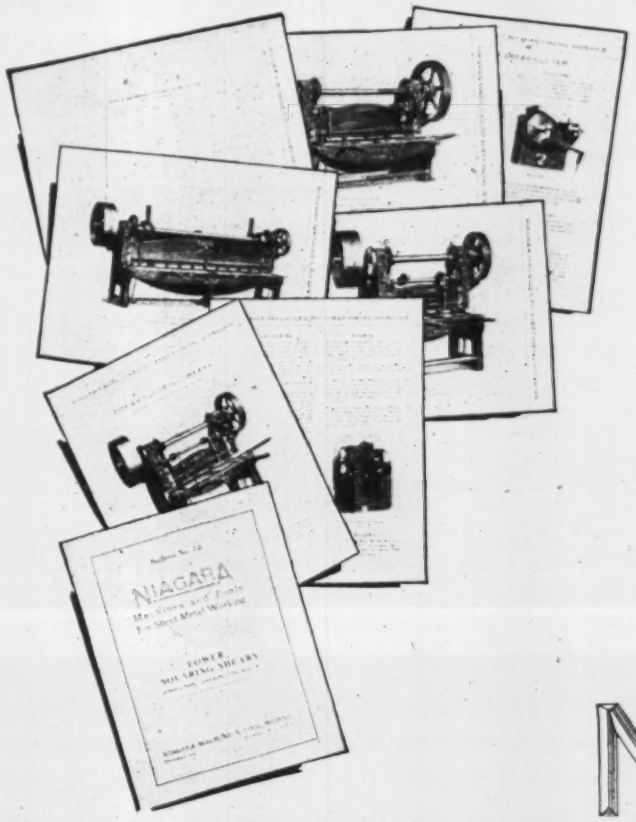

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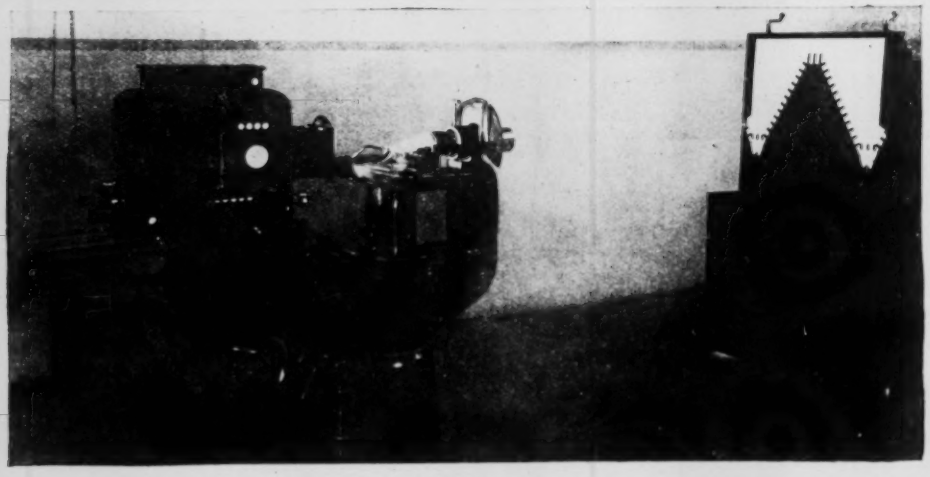
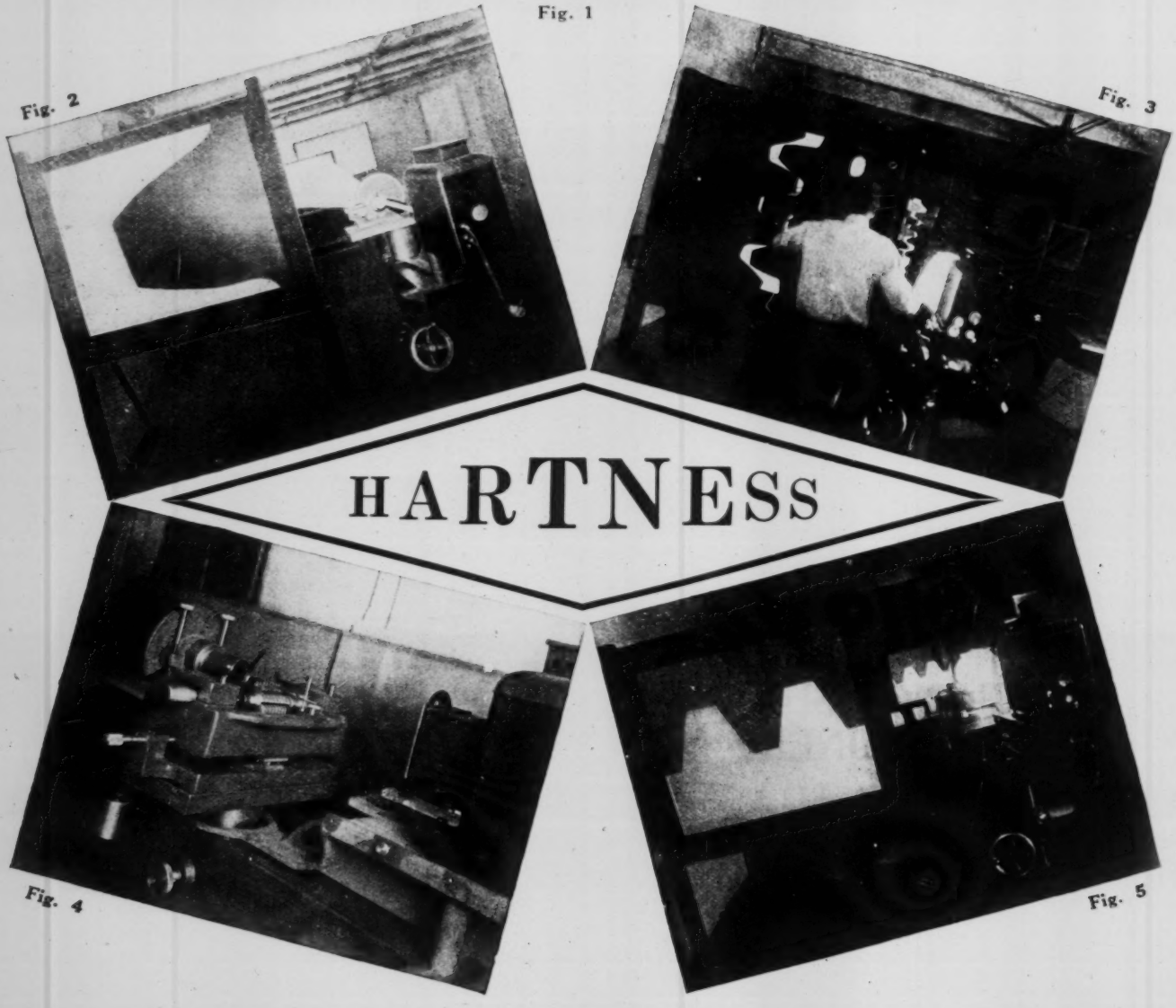


Fig. 1



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Screw Thread Comparator

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The machine is rigidly constructed with a work table 18 inches long by 7 inches wide, which can be compounded 45 degrees either side of center.

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The machine is equipped with a fixture for mounting centered work, taps, gages or hobs. Fig. 4 shows this fixture used to inspect hobs. The hob is mounted between centers. A tooth is projected into a true outline on the screen. When the tooth is projected into a true outline, any error in form can be readily detected. A size block can then be inserted between the stop in the carriage and the micrometer anvil in the base. A tooth spaced equal to the thickness of the size block should fall into the outline on the screen. If the lead is long or short, the shadow will be displaced from the outline equal to the error in pitch. Fig. 5 shows the shadow of the hob projected back on the screen.

The machine is *supplied with* either incandescent lamp or carbon arc as a light source.

The lenses can be supplied in three powers, i. e., 38, 82, and 123 millimeters:

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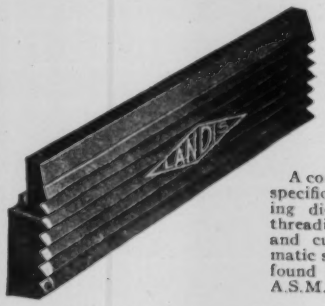

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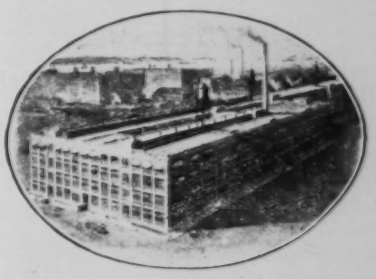

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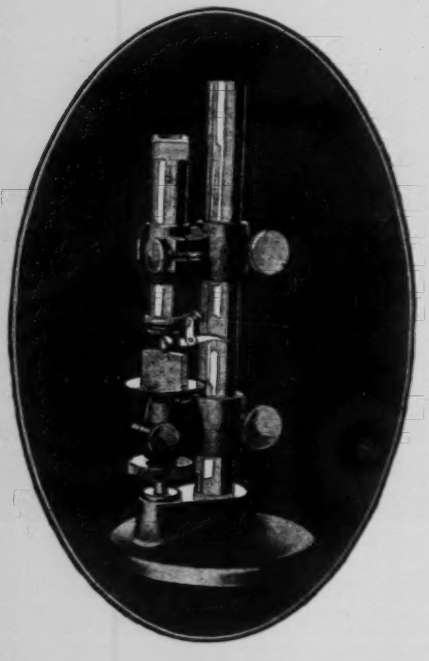

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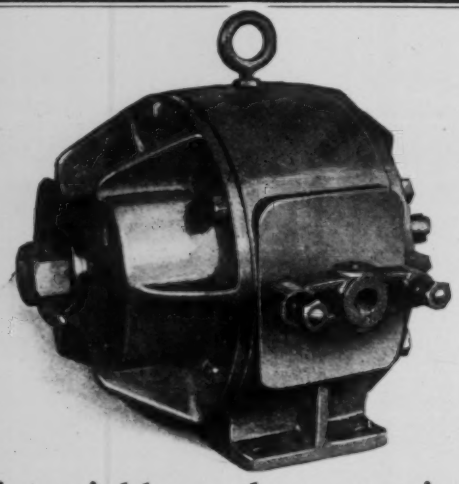

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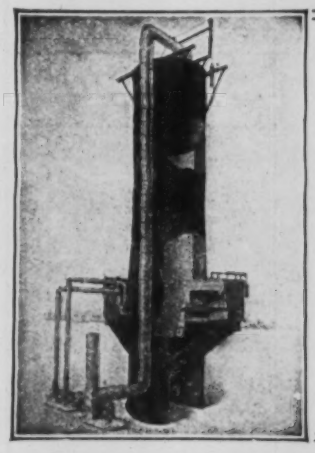

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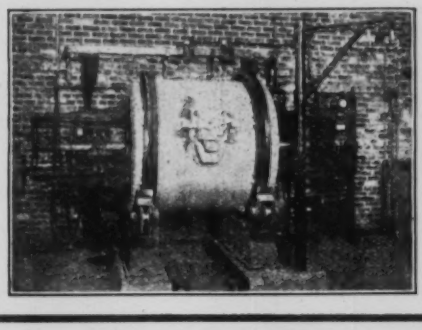

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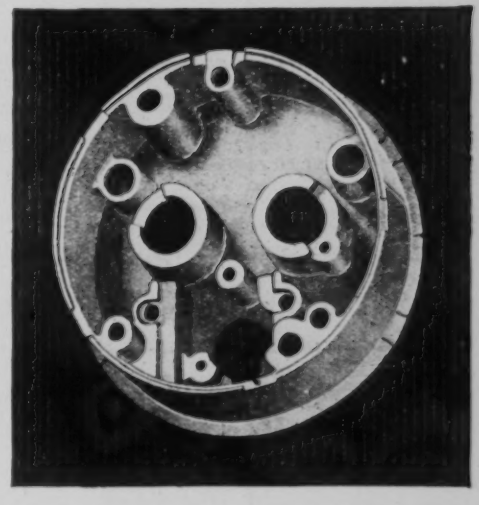

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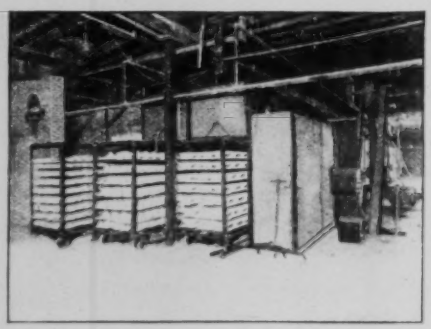

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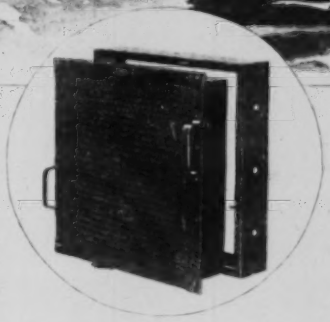

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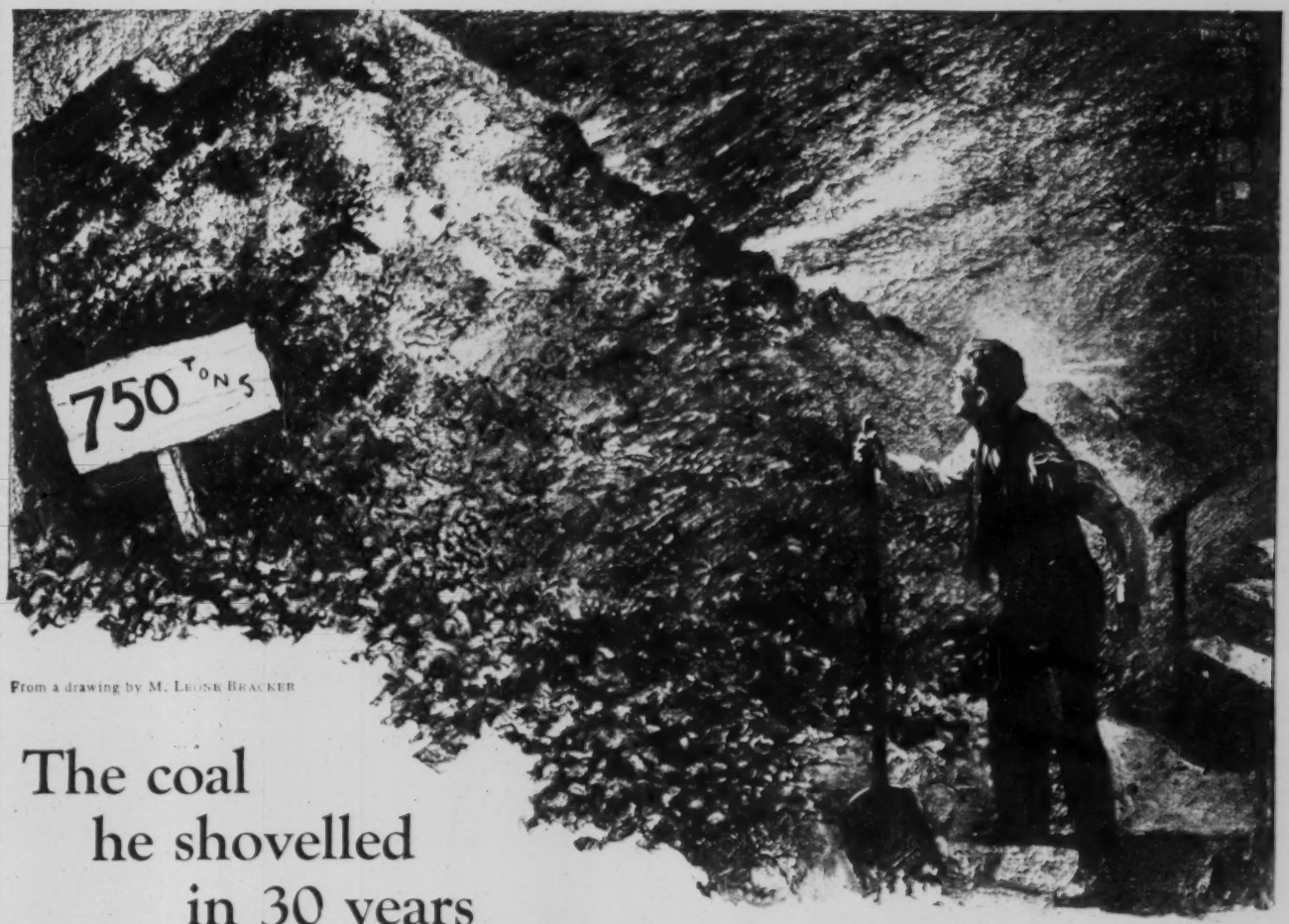

From a drawing by M. LEONE BRACKER

The coal he shovelled in 30 years

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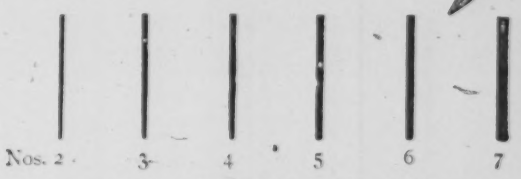

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Established 1857
ALEXANDER & DOWELL
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FOR SALE—One 108 inch Zaremba Patent Triple Effect Evaporator Unit. One 96 inch Patent Single Effect Evaporator Unit for Finishing. Both complete with all auxiliary piping, pumps, traps, fittings, etc. These two units have been in service for about one year and are placed on sale because of change in manufacturing. For detailed description write to: American Burtonizing Company, 171 Madison Ave., New York, N. Y.

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Symposium on Economical Use of Fuel		1649	.75	1.20
Chemical and Physical Control of Boiler Operation	E. A. Uehling	1661	.25	.40
Some Factors in Fuel Economy in Boiler Plants	Robt. H. Kuss	1676	.25	.35
Pulverized Coal as a Fuel	N. C. Harrison	1701	.25	.35
Pulverized Coal for Stationary Boilers	Scheffler and H. G. Barnhurst	1702	.40	.50
Economy of Certain Arizona Steam-Electric Power Plants Using Oil Fuel	C. R. Weymouth	1703	.30	.45
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THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Publication Sales Department **29 WEST 39th STREET, NEW YORK**

Use high quality oils to reduce FRICTION—the unseen enemy of production in your plant.

PENNY-*shaving*—

a dangerous practice in plant management

Plant superintendent:	"Did you send to the express office for those new bearings?"
Engineer:	"Yes sir, and they have not come."
Plant superintendent:	"That means another day of shut-down?"
Engineer:	"Yes sir."
Plant superintendent:	"Exactly, what was the cause for those bearings burning out?"
Engineer:	"Poor oil, sir, and what's more, other bearings will go the same way because we are using the same oil on them."

SHAVING pennies with poor oil is costly practice when it comes to the lubrication of machinery that makes your products and your profits.

The use of high-grade oils brings infinitely greater credit to the management. And it is cheaper in the end.

For example, on the quantity of oil required make this comparison:

If, say, 100 gallons of "oil" at 30c a gallon would lubricate all your machinery for a week, and 100 gallons of the correct high-grade lubricating oil at 50c would lubricate for 2 weeks—which oil is the cheaper by the month?—by the year?

To the savings in oil consumption you can add the cost of repairs and shut-downs which correct lubrication prevents. Add the profits that accrue from the continuous operation of your individual machines. Add the savings in power costs—coal or electric current which correctly lubricated prime movers invariably produce. Add the slower depreciation of your equipment which high-grade oils, correctly applied, will insure.

In many plants the sum total of these savings more than wipes out the entire oil bill for the whole year.

No plant is too large, none too small to profit by our 57 years of specialized experience, our studies, our oils, and our service. Usually our representative can prescribe the correct oil on the day he calls. In large plants where operating conditions are more complex, we suggest a Lubrication Audit which is outlined in column at right.

If you wish to take out the cheapest kind of insurance on both your machinery and its faithful operation, we suggest that you get in touch with our nearest branch office.

GARGOYLE

Lubricating Oils

A grade for each type of service

VACUUM OIL COMPANY

THE Lubrication Audit

EXPLAINED STEP BY STEP
(In Condensed Outline)

INSPECTION: A thoroughly experienced Vacuum Oil Company representative in cooperation with your plant engineer or superintendent makes a careful survey and record of your mechanical equipment and operating conditions.

RECOMMENDATIONS: We later specify, in a written report, the correct oil and correct application of the oil for the efficient and economical operation of each engine and machine.

This report is based on:—

(1) The inspection of the machines in your plant.

(2) Your operating conditions.

(3) Our 57 years of lubricating experience with all types of mechanical equipment under all kinds of operating conditions throughout the world.

(4) Our outstanding experience in manufacturing oils for every lubricating need.

CHECKING: If, following our recommendations in this Audit, you install our oils, periodical calls will be made to see that the desired results are continued.

FOR THE ABOVE FREE SERVICE address our nearest branch office.

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Albany	Des Moines
Dallas	Kansas City, Mo.
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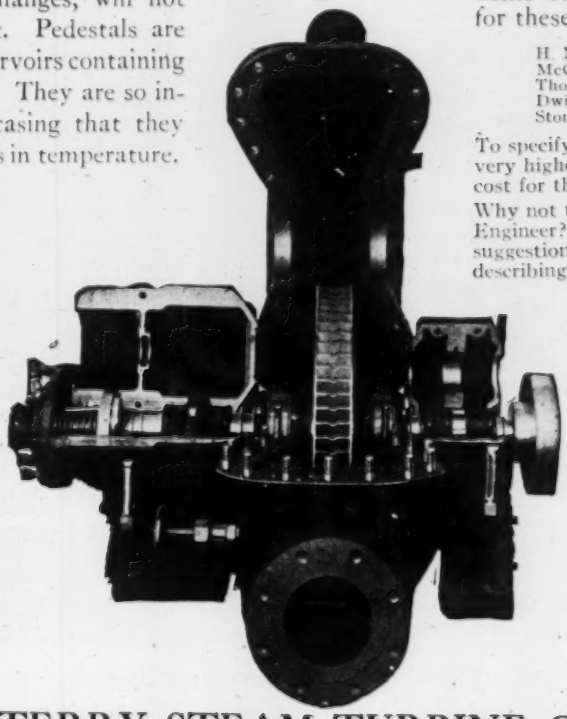
A NEW TERRY ACHIEVEMENT

New Terry design for high pressures and super-heats endorsed by leading engineers and central stations

To meet the severe conditions encountered in the latest super-stations using high pressures and superheats, TERRY has developed a turbine housed in a cast steel casing.

High pressure steam passages are hydraulically tested to 1000 pounds pressure and the case is secured to cast iron pedestals in such a way that distortion of the case, due to sudden temperature changes, will not affect the shaft alignment. Pedestals are equipped with large oil reservoirs containing ample water cooling coils. They are so insulated from the turbine casing that they are not affected by changes in temperature.



Like all TERRY turbines, this new design has won immediate approval. A few of the important central stations for which it has been purchased are:

Boston Elevated Railway Company
Brooklyn Edison Company
Cleveland Electric Illuminating Co.
Indiana Electric Company
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Some of the engineering firms responsible for these installations are:

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To specify and install a TERRY is to insure the very highest turbine efficiency at lowest operating cost for the lifetime of your station.

Why not talk over your problems with a TERRY Engineer? He may be able to offer you valuable suggestions for reducing operating costs. Bulletin describing the NEW TERRY turbine sent on request.

THE TERRY STEAM TURBINE COMPANY
TERRY SQUARE, HARTFORD, CONN.
Offices in Principal Cities

T-901

The TERRY TURBINE

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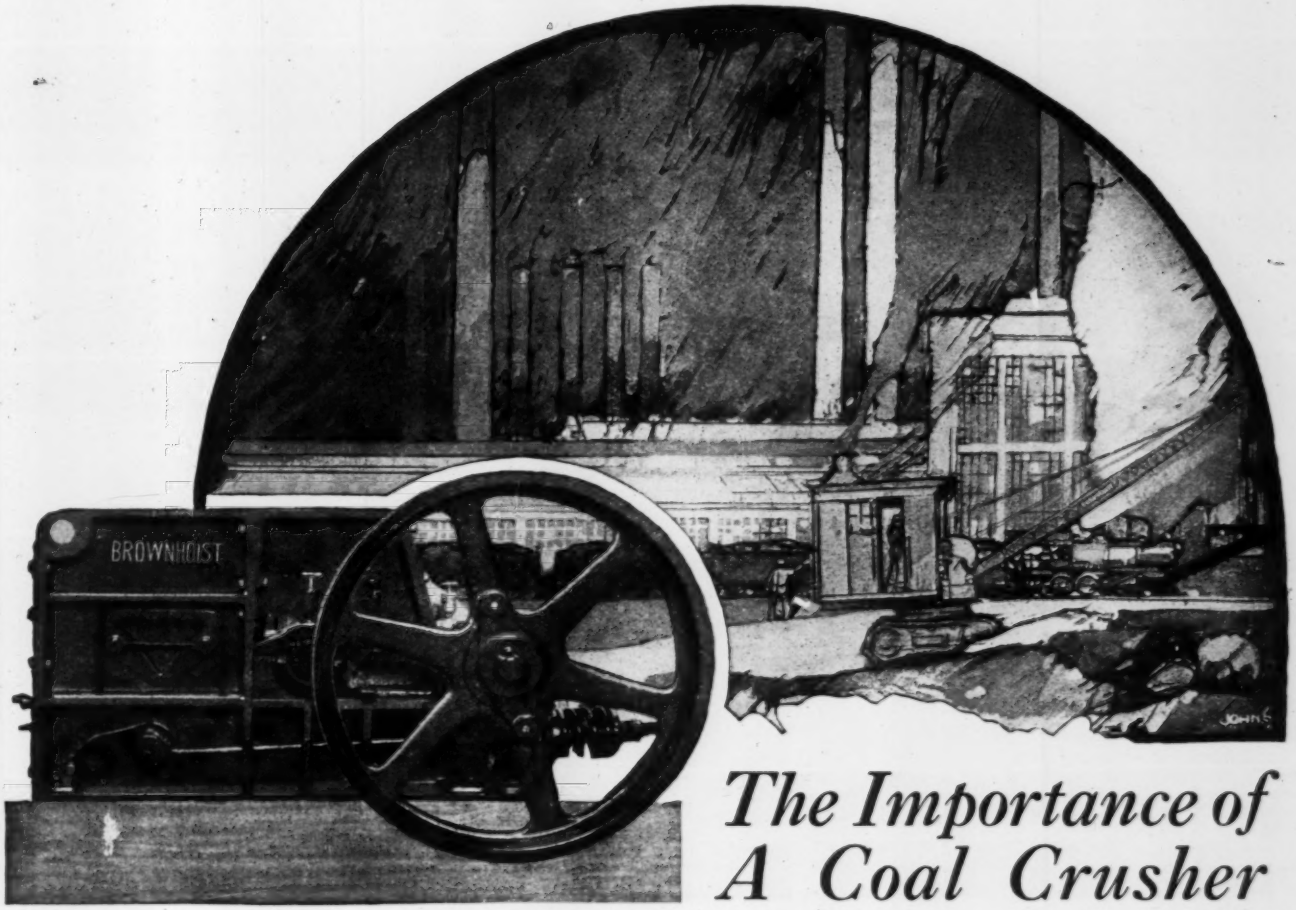

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Brownhoist Single Roll Crushers are made in eighteen, twenty-four and thirty-inch sizes. They are designed for reducing run-of-mine bituminous coal into sizes suitable for automatic stoker use.

A most important unit in the coal handling system, often overlooked, is the coal crusher. On the faithfulness with which it stays on the job and does its work, depends the efficient operation of the entire coal handling system. Dependable performance therefore, should be the first consideration in your choice of a crusher.

Unfailing dependability is one of the inbuilt qualities of the Brownhoist Single Roll Coal Crusher. Day in and day out it stays on the job, performing faithfully and well the service for which it was intended. Tramp iron and foreign matter may jam it temporarily but this crusher is so constructed that such materials can be easily removed in a few minutes time. Large hand holes in the side plates permit of easy access to the interior without tearing down the crusher. Even the roll itself may be removed without disturbing the hoppers.

Ruggedly built and well designed, the Brownhoist Single Roll Crusher will operate satisfactorily under conditions of abuse and neglect that would soon cripple the ordinary crusher. This sturdy machine warrants your attention when considering coal crushing equipment.

A postcard will bring a copy of Catalog F, describing it fully.

The Brown Hoisting Machinery Co., *Cleveland, Ohio*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans

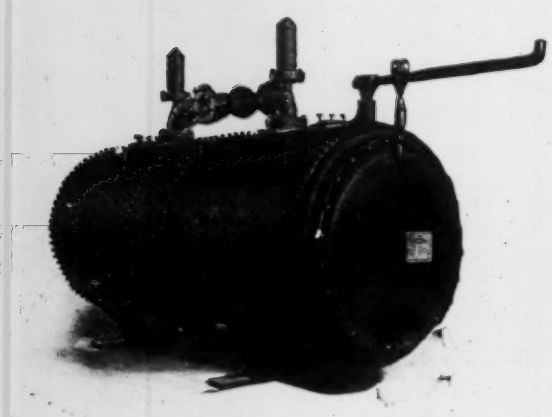
Products: Locomotive Cranes, Buckets, Storage Bins, Belt and Chain Conveyors, Etc.

BROWNHOIST

MATERIAL HANDLING EQUIPMENT

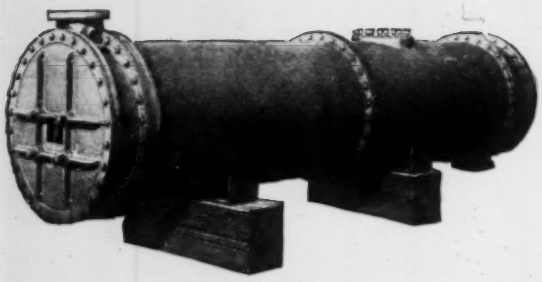
Heaters

Latest Elliott Designs



Open Feed Water Heaters

Welded and riveted steel shells for superheated exhaust steam; cast iron of heavy ring type for usual industrial service.



Closed Feed Water Heaters

Welded and riveted shells with rolled tubes for high pressure; cast iron with metallic packed or rolled tubes for vacuum service.

Double-Head Jet Condenser Heater

For large water capacity and uniform load factors.

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BALL BEARINGS were the only solution in this hydraulic transmission (covered by bulletin No. 154 F. E. of the New Departure Reference Book illustrated).

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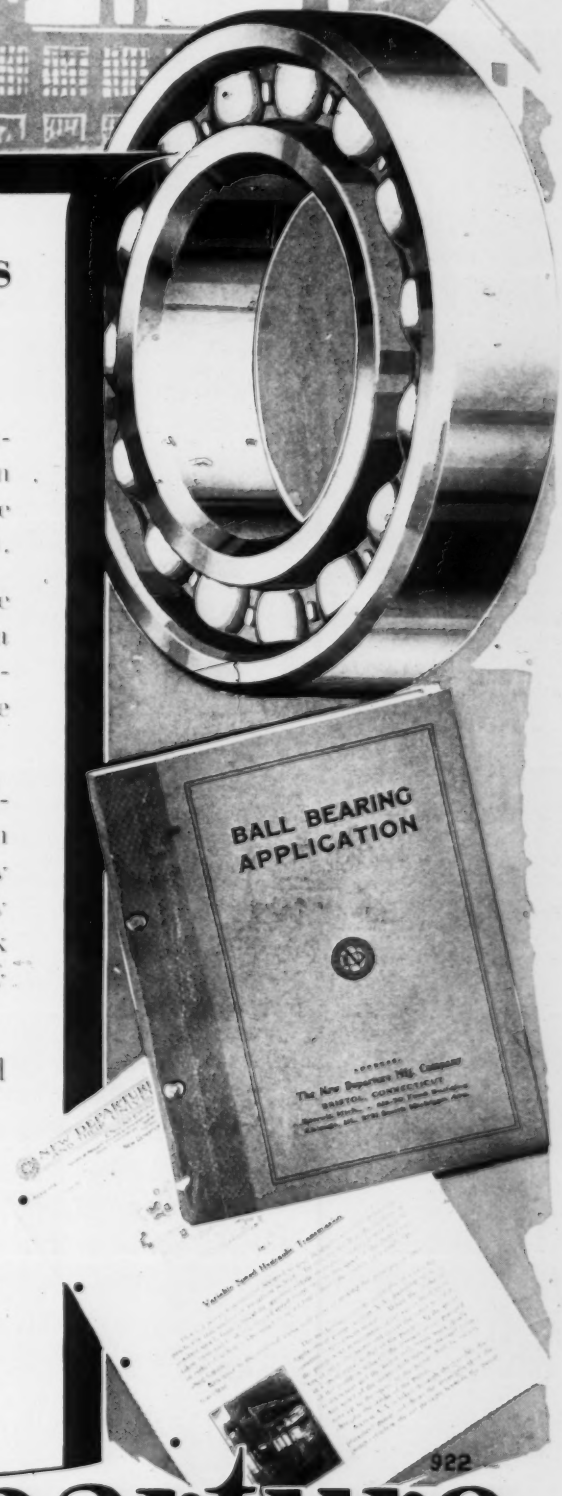
Both the Book and the Service are issued without obligation to technical men who give their connection and official capacity.



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Three Important Points of Construction

Venturi Nozzles

Confined area in nozzles increases the velocity of air through blocks to fuel bed. Utilizes the under grate air supply without increasing the pressure.

Lugs

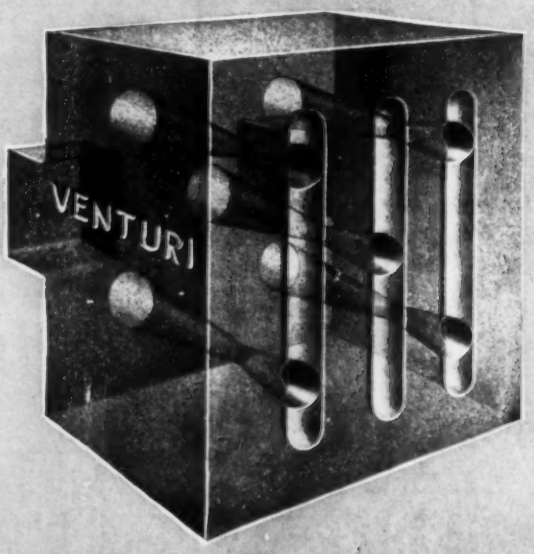
Every block has two lugs so that it is firmly bonded, thus giving strength equal to a solid wall, leaving air space that maintains uniform volume and velocity of air at each orifice in blocks.

Fluted Faces

Positively prevent coal and ash from plugging holes and afford 20% cooling area on face of block. Permit jets to drive air in fuel bed.

Tests have proven the worth of DRAKE BLOCKS in modern engineering practice. Repeat orders prove their merit.

No. 5—Venturi Nozzle Type



The Blocks that prevent clinker formation on furnace walls

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